Cancer
in
South Dakota
2002

South Dakota Cancer Registry
Department of Health

Cancer in South Dakota 2002

Annual report of cancer incidence and mortality prepared by the South Dakota Cancer Registry (SDCR)

Primary Author:

Mynna Boodhoo Kightlinger, MSPH, Cancer Registry Coordinator

Contributing cancer registry staff

Kay Darrington, CTR, Data Operations and Quality Assurance
Mary Sarvis, Policy Analyst, Data

Reviewers

Department of Health Staff

Colleen Winter, Norma Schmidt and Jacy Clark, Office of Health Promotion
Kathi Mueller, Kay Darrington and Mary Sarvis, Office of Data, Statistics and Vital Records
Barbara Buhler, Administration
And
Lindsay Rounds, South Dakota Comprehensive Cancer Consortium

South Dakota Department of Health

Suggested Citation

Cancer in South Dakota, 2002. Department of Health, Pierre, SD. November 2005.

All material in this report may be reproduced or copied without permission. However, citation as to source is appreciated.

WEB Access: This report is also available on the internet at the following URL:
http://www.state.sd.us/doh/Pubs2/Cancer2002.pdf

SDCR Staff

Mynna Boodhoo Kightlinger, MSPH, Cancer Registry Coordinator: grant management, registry operations, research and surveillance, cancer concerns, queries and cluster inquiries.

Kay Darrington, Certified Tumor Registrar (CTR): software management, abstracting, consolidating and quality assurance
        Contact: 605-773-6345   kay.darrington@state.sd.us

Mary Sarvis, Policy Analyst: abstracting and statistics

DIVISION OF HEALTH AND MEDICAL SERVICES

Community Health Services
Disease Prevention
Family Health
Health Promotion
State Epidemiologist

SOUTH DAKOTA CANCER REGISTRY (SDCR)　　　　　15 November 2005

Dear Colleague:

The South Dakota Cancer Registry is pleased to present its annual report *Cancer in South Dakota 2002*, which is a resource of information on cancer among South Dakotans. The report contains surveillance data for years 1998-2002 and trends for selected sites from 1998-2002.

The information in this report is available due to diligent efforts of hospital-based cancer registrars, as well as staff from hospitals, ambulatory surgery centers, pathology laboratories, numerous physicians' offices, and other states where South Dakotans are diagnosed/or treated for cancer. The SDCR and the Department of Health acknowledges and greatly appreciates their timely, accurate and complete incidence reporting. The SDCR cannot accurately define the burden of cancer in our state without their cooperation.

This document was not published in a hard copy; therefore, download as many copies as you wish from this web site.

Please direct your request for data concerns, queries or other information, please to:

605-773-5740 or by E-mail: mynna.kightlinger@state.sd.us

Thank you for your continued cooperation to reduce cancer incidence and mortality in South Dakota.

Sincerely,

Mynna Boodhoo Kightlinger
Cancer Registry Coordinator

Tel: 605-773-5740
E-mail: mynna.kightlinger@state.sd.us

TABLE OF CONTENTS

_____

TABLE OF CONTENTS (cont'd)

_____

LIST OF TABLES

LIST OF TABLES (Cont'd)

LIST OF FIGURES

Cancer in South Dakota 2002

I. EXECUTIVE SUMMARY
_____

This report summarizes the state of cancer in South Dakota and includes cancer incidence and mortality data. The data will enable the many organizations working with cancer prevention and control to identify public health problems, target goals for cancer control, and to inform citizens and health care professionals about risks, early detection, and treatment.

Incidence 2002

- 3,864 South Dakotans were diagnosed with invasive, reportable cases of cancer, which excludes the less life-threatening cancers such as _in situ_ cancers (except _in situ_ bladders) and the common skin cancers.

- Each day 10 South Dakotans are diagnosed with cancer.

- The top five cancer sites accounted for 63 percent of all cancer cases.

- Prostate cancer was the most common reportable malignancy reported with 673 cases, 17.4 percent of all cases.

- Breast cancer was the second most common reportable malignancy with 579 cases among women and 6 among men, accounting for 15 percent of all cases.

- Colon and rectum cancers were the third most common reportable cancer with 509 cases, 13.2 percent of all cases.

- Lung and bronchus cancers were the fourth most common malignancy with 444 cases, 11.5 percent of all cases.

- Urinary bladder cancers were the fifth most common malignancy with 214 cases, 5.5 percent of all cases.

- More than half, 54 percent, of all new cancers were diagnosed in males and 46 percent were in females, no change from 2001.

- Males had an age-adjusted incidence rate of 579 cases per 100,000 males, 38 percent higher than females with an age-adjusted rate of 417 case s per 100,000 females.

- Whites accounted for 90 percent of cases with 3,481 cases whereas American Indians were 4.5 percent with 174 cases and other or unknown races were 5.5 percent.

- The American Indian age-adjusted incidence rate was 544.3, which is 12 percent higher than the rate among whites, 485 cases per 100,000 persons.

- The South Dakota incidence rate for 2002 was 485 cases, significantly higher than the U.S. SEER rate of 458 cancers per 100,000 persons.

Mortality 2002

- Overall, cancer was the second leading cause of death in South Dakota.

- Cancer surpassed heart disease as the leading cause of death for persons under 85 years old.

- 1,562 South Dakotans died from cancer, accounting for one in every four deaths.

- Each day 4 South Dakotans die from cancer.

- The top five cancers sites causing death accounted for 56 percent of all cancer deaths, down by 3 percent from 2001.

- Lung and bronchus cancers were the first leading cause of cancer deaths with 399 deaths, 25.8 percent of all cancer deaths making it the cause of 1 in 4 deaths due to cancer.

- Colorectal cancer was the second leading cause of cancer deaths with 170 deaths, 8 percent of all cancer deaths.

- Prostate cancer was the third leading cause of death with 110 deaths, 7 percent of all cancer deaths.

- Breast cancer was the fourth leading cause of death with 109 deaths, 7 percent of all cancer deaths and all women.

- Just over half, 51 percent, of all cancer deaths were males and 49 percent were females.

- Males had an age-adjusted death rate of 220 deaths per 100,000 males, 40 percent higher than females with an age-adjusted rate of 157 deaths per 100,000 females.

- Whites accounted for 95 percent of deaths with 1,489 deaths whereas American Indians were 4.5 percent with 70 deaths.

- The American Indian age-adjusted death 244.2, which is 30 percent higher than the rate among whites, 187.2 deaths per 100,000 persons

- South Dakota's death rate for 2002 was 182 deaths, lower than the U.S. SEER rate of 193.5 deaths per 100,000 persons.

Trends

- South Dakota's all sites combined cancer death rates fell by - 4.5 percent change (PC) from 1998- 2002 with a PC of - 4.8 for males and - 6.1 for females.

- The death rate fell by an annual percent change (APC) of -1.5 percent during 1998-2002 with an APC of 1.2 for males and -1.9 for females.

- The PC for whites was - 4.6 and - 4.2 for American Indians.

- The APC was –1.5 for whites and 0.5 for American Indians

Mortality/Incidence ratio (M/I)

- The mortality to incidence ratio (M/I) or case fatality overall was 0.4 for both sexes, 0.4 for males and 0.4 females.

- Liver and intra-hepatic bile duct cancers were by far the most lethal cancer with an M/I of 2.1 for both sexes, 1.6 for males and 3.3 for females.

- Among gender related cancers, ovarian cancer was the highest for females with an M/I of 1.0, the third highest M/I overall in rank, and for males, prostate cancer was 0.2 at the lower end of the ranking.

Years of potential life lost (YPLL), 2002, 1998-2005

- The cancer age-adjusted YPLL for South Dakota for 1998-2002 was 1,482 years/100,000 persons, the highest of all causes of deaths in South Dakota.

- American Indians had the highest age-adjusted rates for YPLL with 1,894 years for the five year period, 1998-2005 while whites were 1,469 years per 100,000 persons.

- The cancer YPLL was 9,977 years, the highest for all causes of deaths in 2002.

- Lung and bronchus cancers had the highest (not age-adjusted) YPLL with 2,295 year for whites and 139 years for American Indians in 2002

Average Years of Life Lost (AYLL) 2002

- By rank, after childhood cancers, AYLL data shows that American Indians are dying at a much younger age than whites for many cancers.

- Cervical cancer had the leading AYLL for 2002 after childhood cancers for white women with 21.7 years and American Indian women 53.0 years.

II. INTRODUCTION

_____

A limited cancer data collection system was established in 1992 under South Dakota Codified Laws, SDCL 1-43-11-18) and Administrative Rules ARSD 44-22-01. The South Dakota Cancer Registry (SDCR) was established in 2001 to develop a statewide, population-based cancer surveillance system. However, the state legislature amended the law to expand reporting to reflect statewide surveillance. SDCL 1-43-14
has been in effect since 1 July 2005:

> _Any hospital licensed pursuant to chapter 34-12, physician licensed pursuant to chapter 36-4, physician assistant licensed pursuant to chapter 36-4A, nurse practitioner or nurse midwife licensed pursuant to chapter 36-9A, pathology laboratory, or free-standing radiology center that detects, diagnoses, or treats a cancer case in South Dakota shall submit a report to the Department of Health as required by § 1-43-11 to 1-43-17, inclusive._

Reportable cancers for 2002 include all malignant neoplasms except basal and squamous cell carcinomas of the skin and _in situ_ cervical cancers. Many stakeholders such as hospital tumor registries and pathologists submitted data to the central registry. In addition, the SDCR actively followed back pathology reports and abstracted cases from facilities without tumor registries when possible.

The SDCR performs many quality assurance procedures to assure that the data is valid. The data is run through numerous edits and consolidated if received from more than one reporting source.   In addition, the SDCR links the incidence data with mortality files to identify persons whose death records show cancer as a cause of death but these cancers were not reported to the central registry. The SDCR also links the incidence file with the Indian Health Service database to identify any American Indian South Dakotan, who was misclassified as another race.

The SDCR uses the cancer incidence data reported as well as the mortality data and health behavior surveys collected by vital statistics to provide useful information for cancer control and prevention programs, researchers, clinicians and policy makers. The SDCR is able to answer various epidemiological questions such as:

- ✓ How many South Dakotans are diagnosed or died from cancer each year?
- ✓ What are the most common cancers?
- ✓ When are cancers being diagnosed, i.e. at what stage?
- ✓ Which cancers are the deadliest?
- ✓ Who is affected by cancer the most?
- ✓ What are the trends in cancer incidence and mortality?
- ✓ Where are cancers occurring?
- ✓ Where and what are the disparities?
- ✓ Are screening efforts working?

Every life is touched by cancer in some way whether one is stricken with the disease or has a family or friend with the disease. Although cancer is primarily a disease of people over 50 years old, the younger a person dies form cancer, the greater the impact on societal and economic costs. Cancer concerns voiced by South Dakotans are a priority for the SDCR.

As the SDCR continues to collect population based data and as more healthcare entities and providers report cases, there will be more questions that could be answered with the data. Some questions that could be answered with more data would be to look at some modifiable risk factors such as obesity and exercise with incidence. The Harvard Report on Cancer Prevention in 1996 researched the risk factors for cancer. The estimated percent of total cancer deaths attributed to established causes of cancer were:

Risk Factor	Percentage
Tobacco	30 %
Adult diet/obesity	30 %
Sedentary lifestyle	5 %
Occupational factors	5 %
Family history of cancer	5 %
Viruses/biological agents	5 %
Perinatal factors/growth	5 %
Reproductive factors	5 %
Alcohol	3 %
Socioeconomic status	3 %
Environmental pollution	2 %
Ionizing /UV radiation	2 %
Prescription drugs/medical procedures	1 %
Salt/food additives/contaminants	1 %

The most successful way to prevent cancer is to limit the number of modifiable risk factors by following these guidelines:

- Do not smoke
- Maintain a healthy weight
- Get at least 30 minutes of physical activity every day
- Eat a healthy diet
- Limit alcohol intake to less than one drink a day.
- Protect yourself from the sun
- Protect yourself and your partners from sexually transmitted diseases.

> Studies suggest that quitting smoking and leading a healthy lifestyle could prevent two-thirds of the approximately 1,600 cancer deaths that occur each year in South Dakota

As the SDCR expands data collection, it should become more useful to help prevention and control programs to target at risk populations as well as support epidemiologic studies such as pattern of care studies. The end goal is to produce valid and accurate data reflecting the complete evaluation of cancer in South Dakota, and to disseminate the information in a timely manner.

III. TECHNICAL NOTES

_____

Cancer case definitions: A "cancer case" is defined as the primary cancer site, i.e., the site where the cancer started. Since an individual can have more than one primary cancer site, the number of incident cancer cases could be greater than the number of persons who are diagnosed with cancer. A metastasis is not a primary site.

Age-adjusted incidence rate: Age-adjusted incidence rates were calculated using the direct method and standardized to the age distribution of the 2000 U.S. Standard Population (Appendix A). Age adjustment allows rates for one geographic area to be compared with rates from other geographic areas that may have differences in age distributions. Any observed differences in age-adjusted incidence rates between populations are not due to different age structures. Reports prior to 1999 used the 1970 U.S. Standard Population.

In conformity with the National Cancer Institute's (NCI) Surveillance, Epidemiology, and End Results (SEER) Program guidelines, the incidence rates for cancer sites exclude the following:

•_In situ_ cases, except bladder;

•Basal and squamous cell skin cancers;

•Cases with unknown age; and

•Cases with unknown gender.

Age-specific incidence rates: Age specific rates are calculated by dividing the number of cases for a given age group by the total population of that age group and are expressed as an average annual rate per 100,000 persons by age group. Age specific rates exclude the same types of cases that are excluded from age-adjusted incidence rates. These rates, however, are crude rates, i.e. not age-adjusted.

Age-adjusted death rates: Death rates are calculated for total cases and separately for

males and females. The death rates are age-adjusted to the 2000 U.S. Standard Population using five-year groups, and are per 100,000 persons. Rates are

presented for 2001 and for the five -year period, 1997-2001.

Risks and associated risk factors: These were developed using the "American Cancer Society Textbook of Oncology," and the Harvard Cancer Center, _Causes of Human Cancer_.

Stage at time of diagnosis: Staging is the process of describing the extent or spread of disease from the origin, which is the primary site. Summary staging is the standard used for comparison nationally. SEER Summary Stages 2000 are defined as follows:

In situ Malignant cells are within the cell group from which they arose, without penetration of the basement membrane of the tissue and no stromal invasion. _In situ_ is "in place".
Localized The malignant cells are limited to the organ of origin and have spread no farther than the organ in which they started.
Regional The tumor is beyond the limits of the organ of origin by direct extension to adjacent areas with or without lymph node involvement.
Distant The primary tumor has broken away and has traveled, growing secondary tumors in other parts of the body. It has metastasized.

In situ and localized stages are the _early stages_ of diagnosis. Regional and distant stages are _late stage_ diagnoses. An **invasive cancer** refers to a cancer that has spread into surrounding tissues.

Years of life potential life lost (YPLL): The years of potential life lost is calculated for each individual who dies of a cancer of interest by determining the number of years of additional expected life if that person had lived to 75 years. The YPLL in the general population associated with a particular cancer is the sum of this expectation over all those individuals who died of that cancer in a particular year. YPLL reflects the burden of cancer on younger persons while death rates reflect the burden on older persons.

Average years of life lost (AYLL): This is the extent to which life is cut short due to premature death. This is obtained by dividing the YPLL by the number of deaths. On average each person who dies from cancer loses 15 years of their life.

Confidence intervals (CI): A confidence interval tells how confident we are of the accuracy of the calculated rates. The SDCR uses a computed interval with a given probability of 95 percent, i.e., the true value of the calculated rate is contained within the interval. Thus, given a calculated rate of 191.4 and a confidence interval of 182.1 to 200.8, it is better to say that the true rate will fall between 182.1 and 200.8. The larger the sample size, the shorter the interval size, giving us more certainty that the rate is correct. When CI for percentages contains zero, the rate is considered to be stable. Above zero, it is the statistical significance is higher and below zero it is lower.

Mortality/incidence ratio (M/I): This ratio is calculated by dividing the number of deaths in a given year by the number of new cancers diagnosed in the same year. The death to case ratio provides a crude indication of the prognosis for patients. A ratio approaching 1.0, when the number of deaths equals the number of cases for a particular type of cancer, indicates a poor prognosis. A lower ratio indicates fewer deaths relative to the number of cases and suggests a better prognosis.

Statistical significance: This determines whether an event happens by chance alone. The null hypothesis states that in a given place and a period of time, all events occur randomly by chance. If not, then there is statistical significance. Confidence intervals are used to test statistical significance in this report. If the confidence intervals of two different rates intersect each other, then there is no statistical difference between the two rates.[1] However, if the confidence intervals do not intersect one another there is statistical significance. This report looks at the South Dakota rates as compared to the U.S. national rates using SEER data.

Percent change: The difference between two rates expressed as a percentage.

Annual percent change (APC): The annual percent change is the average rate of change in a cancer rate per year in a given time frame indicating how fast or how slowly a cancer rate has increased or decreased each year over a period of years. A negative APC describes a decreasing trend, and a positive APC

describes an increasing trend. In this report, a five-year period 1997-2001 was used and the calculations were made using *SEER STAT*.

Data source: All data, tables and figures come from the South Dakota Department of Health, *American Cancer Society Facts and Figures 2002* or *SEER Cancer Statistics Review 1975-2002* and should be cited as such if taken out of this report in part. SEER data represents approximately 10% of the U.S population.

Disparity: Health disparities are differences in the incidence, prevalence, mortality, and burden of diseases and other adverse health conditions that exist among specific population groups in the United States.[2] Health disparities can be defined as a specific group bearing a disproportionate share of negative health outcomes compared to the general population, i.e., disease, disability, and death.[3] Disparity can occur as a result of factors such as poverty, living in geographically
underserved areas and belonging to specific minority groups.

---

[1] BIOSTATISTICS *The Bare Essentials,2nd edition Norman and Shreiner, Page 51*

[2] http://healthdisparities.nih.gov/whatare.html
[3] http://www.cdphe.state.co.us/tpi/healthdisparities.ht

Limitations to Data Interpretation and Comparison

A number of factors need to be considered when reviewing cancer statistics and interpreting them. A cancer registry database is a fluid and dynamic database, therefore, the reported number of new cases in a particular race, gender and age-cancer category may change for the calendar year for which the data have already been reported in a previous publication. Additional cancer cases which have been previously overlooked for a given diagnosis year may be found and reported to the central registry. There may also be elimination of duplicate records for the same patient, often due to name changes or spelling corrections.

Rate comparisons: When comparing age-adjusted rates and age-specific rates based on fewer than 10 cases, rate comparisons are difficult to interpret. In comparing rates among geographic areas such as counties, states and health districts, the absolute numbers and differences in demographics should be considered, as well as clinical significance of the disease. Data quality indicators for each registry should also be reviewed. Interpretations without considering these factors may be misleading. There will also be differences between mortality statistics published by various agencies and the mortality rates in this report.

Racial misclassifications: When race is not specified in a source document and the default is to record these cases as white or unknown, the results are considered biased. Numerator error can occur because of misclassification.

Statistical significance: In South Dakota, case counts can be very low; therefore, magnitude bias is inherent with confidence intervals and z-tests. For example, in year 2001, cervical cancer rates were 10 per 100,000 American Indian women with 2 deaths and 1.7 per 100,000 white women with 6 deaths, i.e., American Indian women had a cervical cancer age-adjusted rate six times higher than white women in South Dakota. However, the case counts were 2 for American Indians and 10 for whites. Small numbers result in wider confidence intervals, thus less confidence in the data.

Early detection/screening: Improved early detection/screening may produce increases in both incidence and survival rates. Increases may occur as a result of the introduction of new procedures. The interval between the time a cancer is diagnosed by a screening procedure and the time when it would have been diagnosed in the absence of screening procedures is called the lead-time. Changes in lead-time, for example, in breast cancer diagnosis, have led to an increased survival and a reduction of mortality.

Changes in diagnostic criteria: Early detection resulting from either screening or early response to symptoms may result in increasing diagnosis in small tumors that are not yet life-threatening. This may raise incidence and survival rates but without changes in mortality rates. Cancers likely to be affected are breast, colon, cervix uteri, prostate and melanoma. Prostate cancer is particularly prone to changing diagnostic criteria.

Staging: Advancement in diagnostic procedures may change in due time. Advances increase the probability that a given cancer will be diagnosed in a more advanced stage, for example, with new scanning methods, metastases can be detected. Therefore, if someone was previously diagnosed with a localized tumor, they may now be staged as distant. This is called stage migration and can affect the analysis of all solid tumors.

IV. CANCER OVERVIEW IN SOUTH DAKOTA
_____

ALL CANCER SITES
South Dakota, 2002
Incidence and Mortality Summary

	Total	Male	Female
Number of invasive cases	3864	2084	1780
Number of *in situ* cases	232	99	133
South Dakota incidence rate+	485▲	579▲	417
United States incidence rate*	458.2	537.2	404.4
Number of deaths	1562	802	760
South Dakota death rate+	181.9▼	219.7	156.6
United States death rate*	193.5	239.9	162.7
Healthy People 2010 Object	**159.9**		

Rates are per 100,000 persons, age-adjusted to 2000 U.S standard pop.
▲ Statistical significance higher than the U.S. rate; ▼ Statistical significance lower than the U.S. rate
Source: + South Dakota Department of Health
- *SEER Cancer Statistics Review 1975-2002*

Incidence data for 2002 and some incidence aggregate for 2001-2002 are included in this section. Trends in incidence will not be presented as incidence data collected prior to 2001 did not attain the strict quality assurance and editing standards required for inclusion.

Mortality data covered in this section includes 2002, 1998-2002 and some trend data including 1993 to 2002 years.

Data is suppressed at county level if less than 3 counts to protect the identity of individuals. Caution should be used in interpreting data with counts less than 16. Considerable variations can occur from year to year in a large rural state with small population such as in South Dakota.[4] For example, one additional case in a low population density can change the incidence rate to reflect statistical significance. Data with low counts can have wide confidence intervals and are considered unstable hence these rates are not published for counties.

Cancer Incidence: South Dakota collected 3,864 new reportable cancer cases in 2002. The top five cancers are presented in Table 1. Data at the county level range from a low of 186.2 in Ziebach County to 681.8 in

Jerauld County. Five counties: Grant, Hamlin, Marshall, Roberts, and Ziebach had rates statistically lower than South Dakota's rate of 485 cases per 100,000 persons (Table 2). Davison and Minnehaha counties had rates significantly higher than South Dakota's rate. South Dakota's rate in 2002 was statistically higher than the U.S rate of 458.8 cases per 100,000 persons.

Table 1: Top five cancers diagnosed,
South Dakota 2002

Site	No. of Cases	Percentage
Prostate	673	17.4%
Breast	579	14.8%
Colorectal	509	13.2%
Lung & bronchus	444	11.5%
Bladder	214	5.5%

Source: South Dakota Department of Health

Figure 1 shows incidence by county for the two year period 2001-2002 mapped by tertiles.

Figure 1: Cancer age-adjusted incidence rates by county, South Dakota 2001-2002
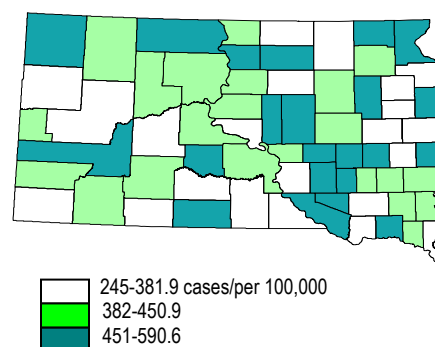
245-381.9 cases/per 100,000
382-450.9
451-590.6

Rates are per 100,000 persons age-adjusted to the 2000 U.S. standard population
Source: South Dakota Department of Health

Eleven counties had significantly lower rates and two counties had significantly higher rates than the South Dakota rate of 460 cases per 100,000 for the period 2001- 2002 as shown in Table 2 on the following page.

---

[4] South Dakota has an area of 77,121 square miles with a population of approximately 760,000 persons and a population density of 9.9 persons per square mile. Population densities range from a low of 1.3 in Ziebach County to a high of 183.3 persons per square mile in Minnehaha County.

Table 2: Age-adjusted incidence rates by county, South Dakota 2002

County	Case	Rate	County	Case	Rate	County	Case	Rate
Aurora	16	380.6	Fall River	64	591.5	Marshall	19	316.3▼
Beadle	109	489.0	Faulk	13	§	Meade	92	439.1
Bennett	14	§	Grant	35	334.1▼	Mellette	9	§
Bon Homme	41	421.1	Gregory	31	406.8	Miner	18	§
Brookings	109	473.7	Haakon	18	652.5	Minnehaha	726	554.5▲
Brown	179	435.5	Hamlin	23	324.8▼	Moody	28	391.1
Brule	28	417.7	Hand	25	421.0	Pennington	443	526.5
Buffalo	3	§	Hanson	14	§	Perkins	19	396.9
Butte	44	434.4	Harding	6	§	Potter	19	411.6
Campbell	11	§	Hughes	81	480.1	Roberts	41	347.4▼
Charles Mix	54	474.9	Hutchinson	59	483.7	Sanborn	21	542.4
Clark	23	411.1	Hyde	8	§	Shannon	36	598.4
Clay	38	374.9	Jackson	15	535.5	Spink	48	493.5
Codington	138	503.6	Jerauld	25	681.8	Stanley	11	§
Corson	18	494.4	Jones	7	§	Sully	6	§
Custer	46	520.2	Kingsbury	37	436.0	Todd	25	576.8
Davison	142	658.7▲	Lake	66	484.1	Tripp	40	481.0
Day	42	416.7	Lawrence	103	433.5	Turner	52	406.4
Deuel	31	525.1	Lincoln	103	498.8	Union	73	547.9
Dewey	23	542.9	Lyman	20	510.2	Walworth	37	391.8
Douglas	24	425.4	McCook	32	405.5	Yankton	110	473.6
Edmunds	14	§	McPherson	24	390.4	Ziebach	3	§

Rates are age-adjusted to the 2000 Standard population; South Dakota's 2002 rate is 485 per 100,000 persons; § count too low for stable rate
▼ Statistical significance lower than the South Dakota rate; ▲ Statistical significance than the South Dakota rate
Source: South Dakota Department of Health

Table 3: Age-adjusted incidence rates by county, South Dakota 2001-2002

County	Cases	Rate	County	Cases	Rate	County	Cases	Rate
Aurora	17	435.9	Fall River	60	536.9	Marshall	22	350.4
Beadle	113	502.8	Faulk	15	§	Meade	87	413.9
Bennett	15	§	Grant	35	342.6▼	Mellette	7	§
Bon Homme	42	430.2	Gregory	24	319▼	Miner	18	405.3
Brookings	106	455.3	Haakon	13	§	Minnehaha	700	534.8▲
Brown	180	437.9	Hamlin	21	313.9▼	Moody	24	330.9▼
Brule	34	538	Hand	26	428.8	Pennington	437	519.7▲
Buffalo	6	§	Hanson	12	§	Perkins	13	§
Butte	52	496.8	Harding	5	§	Potter	16	330.7▼
Campbell	9	§	Hughes	77	444.3	Roberts	40	338.6▼
Charles Mix	54	476.6	Hutchinson	54	431.8	Sanborn	16	418.8
Clark	23	423.4	Hyde	7	§	Shannon	28	461.2
Clay	39	381.7	Jackson	14	517.6	Spink	40	409.1
Codington	130	473.7	Jerauld	21	546.2	Stanley	10	405.4
Corson	12	§	Jones	7	§	Sully	7	§
Custer	41	449	Kingsbury	32	349.2▼	Todd	22	475.8
Davison	128	590.6▲	Lake	60	437	Tripp	35	405.5
Day	39	376.4	Lawrence	99	417.7	Turner	53	412.2
Deuel	30	490.1	Lincoln	89	428.8	Union	70	525.2
Dewey	20	442.9	Lyman	21	535.6	Walworth	32	325.9▼
Douglas	19	333▼	McCook	39	494.2	Yankton	106	450.9
Edmunds	17	273.4▼	McPherson	22	386.1	Ziebach	3	§

Rates are age-adjusted to the 2000 Standard population; South Dakota rate 2001-2002 is 460 per 100,000 persons; § count too low for stable rate
▼ Statistical significance lower than the South Dakota rate; ▲ Statistical significance than the South Dakota rate
Source: South Dakota Department of Health

Cancer in South Dakota 2002

Table 4: Case counts by county for selected sites, South Dakota 2002

	Bladder	Female Breast	Colorectal	Corpus Uterus	Lung & Bronchus	Melanoma	Non-Hodgkin Lymphoma	Prostate
South Dakota	214	573	509	146	444	123	145	673
Aurora	*	4	3	0	*	*	0	*
Beadle	7	11	12	4	11	0	8	27
Bennett	*	4	*	0	0	0	0	*
Bon Homme	*	4	6	2	3	0	*	15
Brookings	5	16	18	6	8	6	*	20
Brown	5	30	19	7	27	9	4	31
Brule	*	3	3	*	5	*	*	5
Buffalo	0	0	*	0	*	0	0	0
Butte	*	3	4	0	6	*	3	7
Campbell	*	*	*	0	0	*	0	*
Charles Mix	6	6	9	2	5	*	4	10
Clark	0	4	4	0	*	*	*	3
Clay	*	5	3	*	5	*	3	7
Codington	7	24	21	8	10	8	5	17
Corson	0	5	0	0	*	*	0	4
Custer	3	9	*	5	8	*	*	9
Davison	12	24	23	5	17	3	4	19
Day	3	6	11	*	8	*	0	3
Deuel	*	4	5	5	*	0	*	5
Dewey	0	4	*	*	*	*	*	3
Douglas	5	3	6	0	*	*	0	3
Edmunds	*	0	*	*	*	*	0	*
Fall River	*	9	6	*	12	3	*	7
Faulk	*	*	*	0	*	*	0	*
Grant	*	7	4	0	7	*	*	9
Gregory	4	3	*	0	*	0	*	7
Haakon	*	*	3	0	*	0	*	*
Hamlin	0	3	7	0	3	0	0	*
Hand	*	*	5	0	3	0	*	6
Hanson	*	4	0	0	*	0	*	4
Harding	0	0	*	0	3	*	0	0
Hughes	*	*	10	3	9	*	*	*
Hutchinson	*	7	14	3	*	*	2	11
Hyde	0	*	*	0	0	*	0	*
Jackson	*	*	*	0	*	0	0	*
Jerauld	*	4	5	*	4	*	*	4
Jones	*	0	*	0	0	*	0	*
Kingsbury	*	4	9	*	4	*	*	9
Lake	*	10	4	*	11	*	3	13
Lawrence	14	9	13	6	14	4	*	21
Lincoln	6	13	11	6	12	4	4	19
Lyman	0	*	*	0	7	*	*	4
McCook	0	4	6	*	*	*	*	8
McPherson	*	*	6	*	4	*	*	3
Marshall	0	*	7	0	3	*	*	3
Meade	4	14	12	*	13	*	*	12
Mellette	0	3	*	*	*	*	0	0
Miner	0	5	0	0	*	*	3	0
Minnehaha	33	109	81	30	86	20	26	128
Moody	5	5	4	0	3	*	0	5
Pennington	22	66	47	14	48	18	24	76
Perkins	0	3	*	0	3	*	0	3
Potter	3	3	8	*	*	*	0	*
Roberts	3	7	3	*	3	*	*	10
Sanborn	0	4	5	0	*	*	0	5
Shannon	*	5	6	*	5	0	*	4
Spink	3	9	5	4	7	0	0	8
Stanley	*	*	*	*	0	*	0	3
Sully	0	*	0	0	*	*	0	0
Todd	*	5	5	0	*	*	0	6
Tripp	*	8	5	*	6	0	0	4
Turner	6	6	9	*	5	*	*	14
Union	*	13	14	*	11	*	6	8
Walworth	*	9	*	*	5	*	6	7
Yankton	7	17	16	4	10	*	*	26
Ziebach	0	0	0	0	*	0	0	*

Note: Cells with counts less < 3 are suppressed
Source: South Dakota Department of Health

Cancer in South Dakota 2002

Table 5 : Cancer incidence by site and gender, South Dakota 2002

Site Group	Total Cases	Total Rate	Male Cases	Male Rate	Female Cases	Female Rate
Total	**3864**	**484.9**	**2084**	**579.1**	**1780**	**417.1**
Oral Cavity and Pharynx	**89**	**11.6**	**63**	**17.6**	**26**	**5.8**
Lip	22	2.8	20	5.5	2	0.5
Tongue	22	2.8	12	3.3	10	2.2
Salivary Gland	12	1.6	9	2.6	3	0.9
Floor of Mouth	7	0.9	5	1.4	2	0.5
Gum and Other Mouth	11	1.3	5	1.5	6	1.2
Nasopharynx	4	0.6	3	0.9	1	0.3
Tonsil	5	0.7	4	1.1	1	0.3
Oropharynx	2	0.3	2	0.6	0	0.0
Hypopharynx	2	0.3	2	0.6	0	0.0
Other Oral Cavity & Pharynx	2	0.2	1	0.3	1	0.1
Digestive System	**728**	**88.9**	**387**	**108.2**	**341**	**73.0**
Esophagus	35	4.4	24	6.7	11	2.6
Stomach	49	6.1	30	8.4	19	4.2
Small Intestine	14	1.6	10	2.8	4	0.7
Colon and Rectum	509	61.9	266	74.2	243	51.3
Colon Excluding Rectum	364	43.8	182	51.0	182	38.2
Rectum and Rectosigmoid	145	18.1	84	23.2	61	13.1
Anus, Anal Canal and Anorectum	8	1.0	3	0.9	5	1.0
Liver & Intrahepatic Bile Duct	14	1.8	10	2.8	4	1.0
Liver	13	3.1	10	2.8	3	0.8
Intrahepatic Bile Duct	1	0.2	0	0.0	1	0.2
Gallbladder	10	1.2	3	0.8	7	1.4
Other Biliary	9	1.1	5	1.4	4	1.0
Pancreas	61	7.4	32	8.9	29	6.4
Retroperitoneum	7	0.9	4	1.2	3	0.7
Peritoneum, Omentum and Mesentery	12	1.5	0	0.0	12	2.8
Respiratory	**484**	**60.2**	**298**	**82.5**	**186**	**42.4**
Nose, Nasal Cavity and Middle Ear	4	0.5	3	0.8	1	0.3
Larynx	34	4.4	25	6.8	9	2.3
Lung and Bronchus	444	55.0	270	74.9	174	39.3
Pleura	1	0.1	0	0.0	1	0.2
Mediastinum and Other Respiratory Organs	1	0.1	0	0.0	1	0.3
Bones & Joints	**5**	**0.7**	**2**	**0.5**	**3**	**0.8**
Soft Tissues including Heart	**17**	**2.1**	**6**	**1.7**	**11**	**2.5**
Skin	**133**	**17.0**	**76**	**21.4**	**57**	**13.9**
Melanomas of the Skin	123	15.7	69	19.5	54	13.4
Other Non-epithelial Skin	10	1.2	7	1.9	3	0.6
Breast	**579**	**74.1**	**6**	**1.6**	**573**	**139.0**
Female Genital System					**231**	**57.0**
Vulva					6	1.3
Vagina					2	0.5
Cervix Uteri					25	7.1

Table 5 : Cancer incidence by site and gender, South Dakota 2002

Site Group	Total Cases	Total Rate	Male Cases	Male Rate	Female Cases	Female Rate
Corpus and Uterus, NOS					146	35.8
Corpus Uteri					140	34.6
Uterus,NOS					6	1.2
Ovary					51	12.1
Other Female Genital Organ					1	0.2
Male Genital System			703	194.2		
Penis			1	0.3		
Prostate			673	186.0		
Testis			28	7.6		
Other Male Genital Org			1	0.3		
Urinary System	**333**	**40.7**	**252**	**70.5**	**81**	**18.0**
Bladder	214	25.7	174	48.8	40	8.4
Kidney and Renal Pelvis	109	13.8	70	19.4	39	9.2
Ureter	8	0.9	6	1.8	2	0.4
Other Urinary Organs	2	0.2	2	0.5	0	0.0
Eye	**6**	**0.7**	**4**	**1.1**	**2**	**0.4**
Brain	**45**	**5.9**	**34**	**9.3**	**11**	**2.7**
Brain	44	5.7	33	9.1	11	2.7
Meninges and CNS	1	0.1	1	0.3	0	0.0
Endocrine	**69**	**9.5**	**17**	**4.8**	**52**	**14.3**
Thyroid	69	9.5	17	4.8	52	14.3
Lymphomas	**171**	**21.1**	**91**	**25.3**	**80**	**18.2**
Hodgkins Lymphoma	26	3.5	16	4.2	10	2.7
Non-Hodgkins Lymphoma	145	17.7	75	21.0	70	15.5
Myeloma	**40**	**5.0**	**18**	**5.0**	**22**	**4.9**
Leukemia	**89**	**11.4**	**54**	**15.0**	**35**	**8.2**
Acute Lymphocytic	9	1.1	6	1.5	3	0.6
Chronic Lymphocytic	22	2.9	14	3.9	8	2.0
Other Lymphocytic	4	0.5	3	0.8	1	0.3
Acute Myeloid	31	3.9	18	5.1	13	3.2
Acute Monocytic	1	0.1	1	0.3	0	0.0
Chronic Myeloid	13	1.6	6	1.7	7	1.6
Other Myeloid-Monocytic	3	0.4	2	0.6	1	0.2
Other Acute Leukemia	4	0.5	4	1.1	0	0.0
Aleukemic, Subleukemia & NOS	2	0.2	0	0.0	2	0.4
Mesothelioma	**6**	**0.7**	**5**	**1.4**	**1**	**0.1**
Kaposi Sarcoma	**1**	**0.1**	**0**	**0.0**	**1**	**0.2**
Miscellaneous	**135**	**16.8**	**68**	**19.0**	**67**	**15.4**

Rates are per 100,000 persons and age-adjusted to the 2000 U.S. standard million
Source: South Dakota Department of Health

Table 4 shows incidence and age-adjusted incidence rates for South Dakota in 2002 by primary sites and gender according to SEER recodes (Appendix C).

Cancer in South Dakota 2002

Stage at diagnosis: Overall 19 % of all cases for all cancers in South Dakota were diagnosed at regional stage and 17% at distant stage (Figure 3).   Stage at diagnosis data by gender are in Figures 4 and 5.

Figure 2: Stage at diagnosis all cancer sites, South Dakota 2002

Total   n= 4,067

Unknown 14%
In situ 7%
Distant 17%
Regional 19%
Localized 43%
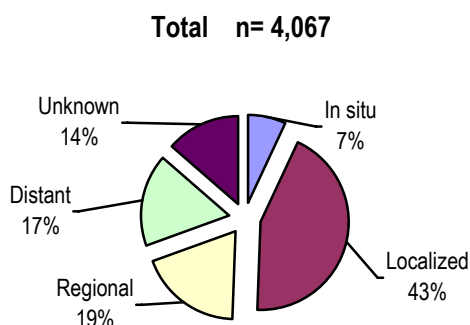
Figure 3: Stage at diagnosis among males, South Dakota 2002

Males   n=2,148

Unknown 23%
In situ 6%
Distant 15%
Regional 14%
Localized 42%
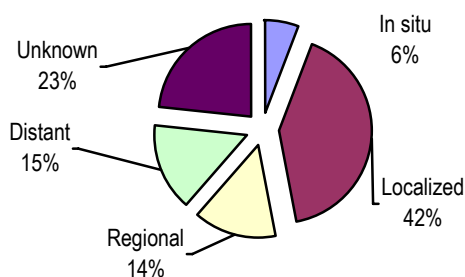
Figure 4: Stage at diagnosis among females, South Dakota 2002

Females   n=1,919

Unknown 13%
In situ 8%
Distant 17%
Regional 22%
Localized 40%
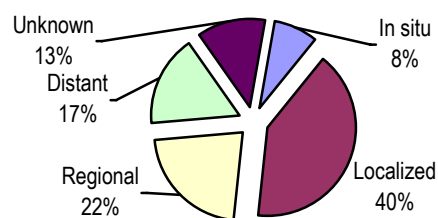
Source: South Dakota Department of Health

More females are diagnosed at regional and distant stages than males. The high percentage of unknown stage should be reduced with more direct abstracting instead of the present method of casefinding through pathology reports and follow-back. Cases of non-Hodgkin lymphoma, myeloma and leukemias are usually at distant stages, and therefore, can skew the proportion of all sites diagnosed at distant stages.

Some differences in percentages by stage and race for selected sites are shown in Figure 22, page 29. There is no disparity between the number of American Indians and whites being diagnosed at distant stage for all sites, colorectal, lung and bronchus and prostate cancers. However, whites had more breast, endometrial, oral cavity and pharynx, and ovarian cancers diagnosed at distant stages, whereas American Indians had more cervical and pancreatic cancers diagnosed at distant stage. Data will be evaluated for the relationship between stage of diagnosis, treatment modalities, survival and mortality as soon as the SDCR has five years of high quality incidence data.

Cancer mortality: South Dakota had 1,592 deaths due to cancer accounting for 22.7% of all deaths in South Dakota during 2002. Death rates ranged from a low of zero in Ziebach County to 362.3 deaths per 100,000 persons in Shannon County. South Dakota's 2002 age-adjusted death rate, 181.9 was significant lower than the United States 2002 SEER rate of 193.5 deaths per 100,000 persons.

Table 6: Top five cancer deaths, South Dakota 2002

Site	Cases	Percent
Lung & bronchus	399	25.8%
Colorectal	170	10.8%
Prostate	110	7 %
Breast female	109	7 %
Pancreas	86	5.4%

Source: South Dakota Department of Health

Overall cancer is the second leading cause of deaths in South Dakota after heart disease. However, cancer ranks as the leading cause of death for persons under 85 years old (Table 7).

Table 7: Cancer and heart disease by rank and age <85 and ≥ 85, South Dakota 1998-2002

	Cancer			Heart Disease		
Year	<85	85 +	Total	<85	85 +	Total
1998	1287	282	1569	1261	841	2102
1999	1327	308	1635	1173	843	2016
2000	1287	317	1604	1187	918	2105
2001	1293	305	1598	1133	851	1984
2002	1255	307	1562	1095	838	1933
1998-2002	6448	1519	7967	5849	4291	10,140

Source: South Dakota Department of Health

For the period 1998-2002, rates ranged from a low of 139.8 in Jerauld County to 293.5 in Buffalo County. Both these counties had low number of deaths; therefore, these rates are unstable. Yankton County was the only county with a five-year age-adjusted death rate that was statistically lower than the five-year South Dakota rate of 189.2 deaths per 100,000 persons. Eleven counties, Bon Homme, Campbell, Clark, Faulk, Jerauld, Mc Cook, McPherson, Marshall, Miner, Moody and Yankton achieved the Healthy People 2010 Objective of 159.9 deaths per 100,000 persons, (Figure 6).

Figure 5: All sites age-adjusted cancer death rates in South Dakota, 1998-2002

☐	120.7-159.9
▨	160- 190.5
▨	190.6-293.5
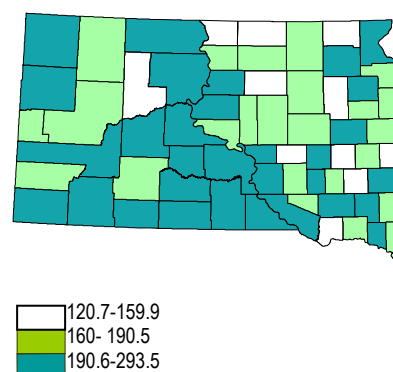
Notes: Healthy People 2010 Objective is 159.9 cancer deaths per 100,000 persons.
Rates are adjusted to the 2000 U.S. standard population.
Source: South Dakota Department of Health

Death rates by counties are in Table 8 for 2002 and in Table 9 for the five-year period 1998-2002.

Table 8: Age-adjusted death rates by county, South Dakota 2002

County	Case	Rate	County	Case	Rate	County	Case	Rate
Aurora	8	§	Fall River	31	243.3	Marshall	16	223.2
Beadle	37	151.4	Faulk	8	§	Meade	45	218.2
Bennett	9	§	Grant	23	199.7	Mellette	4	§
Bon Homme	17	146.9	Gregory	15	§	Miner	8	§
Brookings	40	165.9	Haakon	5	§	Minnehaha	262	198.3
Brown	69	159.1	Hamlin	17	214.4	Moody	4	§
Brule	15	§	Hand	14	§	Pennington	161	194.3
Buffalo	6	§	Hanson	7	§	Perkins	3	§
Butte	20	191.1	Harding	3	§	Potter	8	§
Campbell	*	§	Hughes	33	181.0	Roberts	25	206.4
Charles Mix	24	198.3	Hutchinson	31	210.0	Sanborn	5	§
Clark	8	§	Hyde	3	§	Shannon	11	§
Clay	18	164.7	Jackson	10	§	Spink	26	261.1
Codington	54	197.6	Jerauld	3	§	Stanley	5	§
Corson	6	§	Jones	*	§	Sully	*	§
Custer	22	238.7	Kingsbury	21	192.5	Todd	9	§
Davison	46	189.0	Lake	29	193.5	Tripp	23	262.2
Day	18	162.4	Lawrence	52	209.4	Turner	21	138.9
Deuel	12	177.4	Lincoln	40	185.2	Union	25	181.7
Dewey	8	§	Lyman	11	§	Walworth	21	211.2
Douglas	*	*	McCook	12	§	Yankton	44	171.2
Edmunds	10	§	McPherson	9	§	Ziebach	4	§

Rates are age-adjusted to the 2002 Standard population; § count <16, too low for stable rate
South Dakota's 2002 rate is 181.9 deaths per 100,000 persons
Source: South Dakota Department of Health

Table 9: Age-adjusted death rates by county, South Dakota 1998-2002

County	Cases	Rate	County	Cases	Rate	County	Cases	Rate
Aurora	8	§	Fall River	24	190.8	Marshall	11	§
Beadle	45	187.0	Faulk	7	§	Meade	36	174.6
Bennett	8	§	Grant	21	189.9	Mellette	5	§
Bon Homme	17	143.9	Gregory	17	190.8	Miner	7	§
Brookings	41	170.6	Haakon	8		Minnehaha	271	205.3
Brown	81	187.5	Hamlin	13	169.4	Moody	11	§
Brule	13	§	Hand	12	186.0	Pennington	170	205.3
Buffalo	3	§	Hanson	6	§	Perkins	10	§
Butte	23	219.0	Harding	3	§	Potter	9	§
Campbell	4	§	Hughes	30	164.0	Roberts	29	229.4
Charles Mix	23	191.9	Hutchinson	32	213.7	Sanborn	7	191.7
Clark	9	§	Hyde	5	§	Shannon	16	274.4
Clay	23	212.1	Jackson	5	§	Spink	19	190.5
Codington	55	193.2	Jerauld	5	§	Stanley	6	§
Corson	6	§	Jones	4	§	Sully	4	§
Custer	17	185.4	Kingsbury	3	§	Todd	9	§
Davison	47	203.4	Lake	30	164.0	Tripp	20	223.3
Day	21	197.0	Lawrence	27	184.8	Turner	28	199.8
Deuel	11	§	Lincoln	43	173.6	Union	25	186.4
Dewey	9	§	Lyman	39	181.8	Walworth	17	181.0
Douglas	11	§	McCook	8	§	Yankton	40	160.3▼
Edmunds	11	§	McPherson	14	§	Ziebach	*	§

Rates are age-adjusted to the 2000 Std. population; § count <16 too low for stable rate
▼ Statistical significance lower than the South Dakota rate; **South Dakota rate 1998-2002 is 189.2 per 100,000 persons**
Source: South Dakota Department of Health

Cancer in South Dakota 2002

Table 10 : Deaths by selected cancer site and county, South Dakota 2002

		Colorectal	Lung & Bronchus	Female Breast	Non-Hodgkin Lymphoma	Prostate
South Dakota	38	170	399	109	55	110
Aurora	*	*	*	*	0	*
Beadle	*	7	8	*	4	*
Bennett	*	0	0	0	0	*
Bon Homme	0	*	0	0	*	3
Brookings	3	4	13	3	0	*
Brown	*	*	27	*	7	*
Brule	0	0	6	*	0	*
Buffalo	0	*	*	0	0	0
Butte	0	3	7	0	3	0
Campbell	0	0	0	0	0	0
Charles Mix	*	*	6	*	*	*
Clark	0	*	*	0	0	*
Clay	0	*	5	3	0	*
Codington	0	5	13	*	*	3
Corson	0	*	3	0	0	0
Custer	*	0	6	*	0	*
Davison	*	6	10	5	0	3
Day	*	4	6	3	0	3
Deuel	0	0	*	*	*	*
Dewey	0	0	3	0	0	0
Douglas	0	*	0	0	0	0
Edmunds	0	4	*	*	0	0
Fall River	*	3	10	0	0	4
Faulk	*	6	3	*	0	*
Grant	*	4	*	*	0	3
Gregory	*	5	*	0	0	*
Haakon	0	*	*	0	0	0
Hamlin	0	*	3	*	0	*
Hand	0	*	*	*	3	*
Hanson	0	3	*	*	0	0
Harding	0	0	*	0	0	0
Hughes	*	*	7	4	0	0
Hutchinson	0	3	6	3	0	0
Hyde	0	0	0	0	0	*
Jackson	0	0	5	0	0	0
Jerauld	0	0	1	0	0	0
Jones	0	1	0	0	0	0
Kingsbury	0	4	3	*	*	4
Lake	0	0	0	*	0	0
Lawrence	1	6	16	8	3	0
Lincoln	*	6	5	5	*	*
Lyman	0	*	*	*	0	*
McCook	0	0	3	*	0	*
McPherson	0	0	3	*	0	*
Marshall	0	5	4	*	*	*
Meade	0	3	11	5	3	4
Mellette	0	0	*	0	0	0
Miner	0	3	*	*	0	0
Minnehaha	9	26	69	13	14	21
Moody	0	*	0	0	0	0
Pennington	2	12	50	12	5	11
Perkins	0	*	*	0	0	0
Potter	0	*	*	0	0	*
Roberts	2	3	8	1	*	*
Sanborn	0	0	*	0	0	*
Shannon	0	*	8	0	0	*
Spink	0	*	0	*	0	0
Stanley	0	*	0	0	0	*
Sully	0	0	*	0	0	*
Todd	0	*	*	*	0	0
Tripp	*	2	5	4	2	4
Turner	0	3	4	*	0	*
Union	*	4	8	0	0	*
Walworth	*	4	5	0	0	3
Yankton	2	6	6	5	0	*
Ziebach	0	0	*	0	0	*

Note: Counts less than 3 are suppressed; Source: South Dakota Department of Health

TABLE 11:Cancer death rates by site and gender, South Dakota 2002

	Total		Males		Females	
	Deaths	Rate	Deaths	Rate	Deaths	Rate
Total	**1562**	**181.9**	**802**	**219.7**	**760**	**156.6**
Oral Cavity & Pharynx	**25**	**2.9**	**16**	**4.3**	**9**	**1.3**
Lip	1	0.1	1	0.3	0	0.0
Tongue	8	0.9	4	1.1	4	0.6
Salivary Gland	5	0.5	1	0.3	4	0.6
Floor of Mouth	1	0.1	1	0.3	0	0.0
Gum and Other Mouth	3	0.3	2	0.5	1	0.1
Nasopharynx	1	0.1	1	0.3	0	0.0
Hypopharynx	1	0.1	1	0.3	0	0.0
Tonsil	1	0.1	1	0.3	0	0.0
Oropharynx	2	0.3	2	0.3	0	0.0
Other Oral Cavity & Pharynx	2.0	0.3	2	0.5	0	0.0
Digestive Sys	**368**	**42.3**	**185**	**50.5**	**183**	**35.2**
Esophagus	31	3.8	25	6.7	6	1.2
Stomach	34	4.0	20	5.5	14	2.8
Small Intestine	6	0.7	4	1.1	2	0.4
Colorectal	170	19.0	79	21.7	91	16.9
Colon Excluding Rectum	145	16.2	69	19.0	76	14.2
Rectum and Rectosigmoid	25	2.8	10	2.7	15	2.7
Anus, Anal Canal and Anorectum	0	0.0	0	0.0	0	0.0
Liver and Intrahepatic Bile Duct	29	3.4	16	4.4	13	2.8
Liver	22	2.7	13	3.6	9	1.9
Intrahepatic Bile Duct	7	0.6	3	0.8	4	0.8
Gallbladder	5	0.6	2	0.5	10	2.3
Other Biliary	5	0.5	2	0.6	4	0.9
Pancreas	86	10.4	37	10.0	49	10.3
Retroperitoneum	0	0.0	0	0.0	0	0.0
Peritoneum, Omentum and Mesentery	1	0.1	0	0.0	1	0.1
Other Digestive Organs	1	0.1	0	0.0	1	0.1
Respiratory System	**413**	**49.4**	**246**	**66.8**	**167**	**36.4**
Nose, Nasal Cavity and Middle Ear	2	0.3	2	0.5	0	0.0
Larynx	10	1.3	9	2.4	1	0.2
Lung and Bronchus	399	47.6	234	63.6	165	36.8
Pleura	0	0.0	0	0.0	0	0.0
Trachea and Other Respiratory Organs	2	0.3	1	0.3	1	0.2
Bones and Joints	1	0.2	0	0.0	1	0.3
Soft Tissue (Including Heart)	**13**	**1.6**	**7**	**1.9**	**6**	**1.4**
Skin (Excluding Basal and Squamous)	**25**	**2.8**	**14**	**3.8**	**11**	**2.0**
Melanomas Skin	16	1.9	11	2.9	5	1.1
Other Nonepithelial Skin	9	1.0	3	1.1	6	1.0
Breast	**109**	**13.0**	**0**	**0.0**	**109**	**23.8**
Female Genital System	**86**	**17.9**			**86**	**17.9**
Cervix Uteri	10	2.4			10	2.5
Corpus and Uterus, NOS	19	3.6			19	3.6
Corpus Uteri	9	1.6			9	1.6
Uterus, NOS	10	2.0			10	2.0
Ovary	53	10.9			53	10.9
Vagina	0	0.0			0	0.0
Vulva	4	0.4			4	0.4
Other Female Genital Organs	0	0.0			0	0.0

Cancer in South Dakota 2002

TABLE 11   :Cancer death rates by site and gender (cont'd), South Dakota 2002

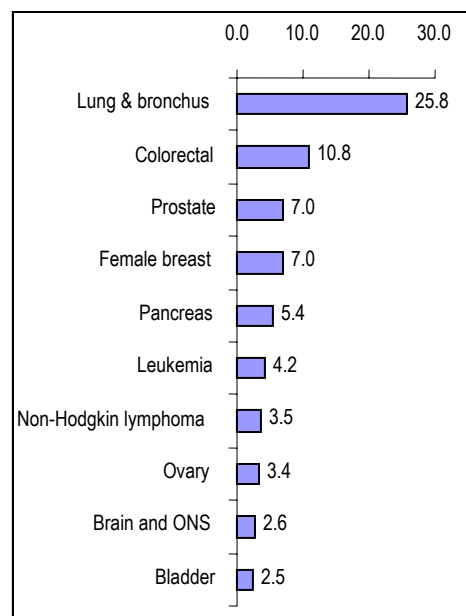|	Total		Males		Females	
	Deaths	Rate	Deaths	Rate	Deaths	Rate
Male Genital System			**112**	**31.5**		
Prostate			110	30.9		
Penis			2	0.5		
Urinary System						
Bladder	38	4.2	26	7.3	12	2.3
Kidney and Renal Pelvis	35	4.2	18	4.9	17	3.9
Ureter	1	0.1	1	0.3	0	0.0
Other urinary organ	2	0.1	1	0.3	1	0.2
Eye and Orbit	**1**	**0.1**	**1**	**0.3**	**0**	**0**
Brain and Other Nervous System	**46**	**5.6**	**29**	**7.9**	**17**	**4.0**
Brain	40	4.9	24	6.7	16	3.7
Meninges, Cranial Nerves and Other Nervous Sys	1	0.1	1	0.3	0	0.0
Endocrine System	**12**	**1.4**	**4**	**1.1**	**8**	**1.8**
Thyroid	6	0.7	2	0.5	4	0.8
Adrenal Gland	2	0.2	1	0.3	1	0.1
Other Endocrine Glands (Including Thymus)	4	0.5	2	0.5	2	0.6
Lymphomas	**59**	**6.9**	**32**	**8.7**	**27**	**5.2**
Hodgkin Disease	4	0.5	2	0.6	2	0.5
Non-Hodgkin Lymphomas	55	6.4	30	8.2	25	4.8
Myeloma	**40**	**4.7**	**19**	**5.2**	**21**	**4.1**
Mesothelioma	**4**	**0.5**	**4**	**1.1**	**0**	**0.0**
Leukemias	**66**	**7.2**	**40**	**10.9**	**26**	**5.3**
Lymphocytic leukemia	22	2.5	12	3.3	9	1.5
Acute Lymphocytic Leukemia	3	0.4	1	0.2	2	0.3
Chronic Lymphocytic Leukemia	16	1.8	10	2.8	6	1.0
Other Lymphocytic Leukemia	3	0.3	1	0.3	1	0.1
Myeloid and Monocytic Leukemias	**28**	**3.4**	**16**	**4.3**	**12**	**2.7**
Acute Myeloid Leukemia	24	2.9	14	3.8	10	2.2
Acute Monocytic Leukemia	1	0.1	1	0.3	0	0.0
Chronic Myeloid Leukemia	2	0.2	0	0.0	2	0.4
Other Myeloid Leukemia	1	0.1	1	0.3	0	0.0
Other Leukemias	**17**	**2.0**	**12**	**3.3**	**5**	**1.2**
Other Acute Leukemia	6	0.6	4	1.1	2	0.4
Other Chronic Leukemia	0	0.0	0	0.0	0	0.0
Aleukemic, Subleukemic, and NOS	11	1.2	8	2.2	3	0.8
Miscellaneous Malignant Cancers	**110**	**12.7**	**51**	**14.1**	**59**	**11.7**

Rates are per 100,000 persons and age-adjusted to the 2000 US standard population
Source: South Dakota Department of Health

Sites by death were evaluated using SEER Death recodes (Appendix D). Five percent more males than females died from cancer in 2002. However, the male adjusted death rate was 40% higher than the female death rate.
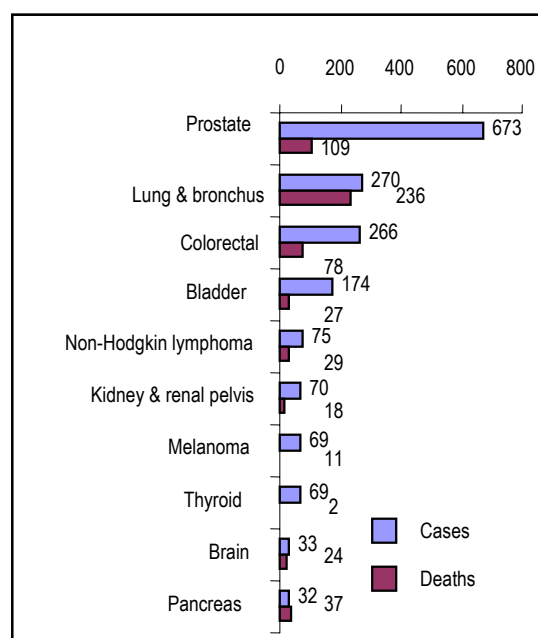
Figure 6: Leading sites of cancer cases , South Dakota 2002

Site	Value
Prostate	17.4
Female breast	14.8
Colorectal	13.2
Lung & bronchus	11.5
Bladder	5.5
Non-Hodgkin lymphoma	3.8
Corpus uteri & NOS	3.6
Melanoma	3.2
Kidney & renal pelvis	2.8
Leukemia	2.3
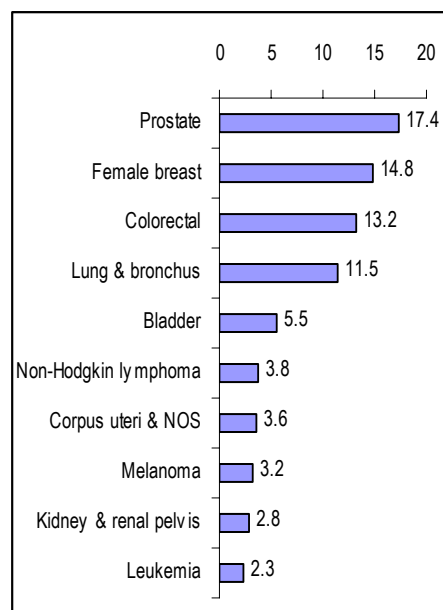
Figure 7: Leading sites of cancer deaths South Dakota 2002

Site	Value
Lung & bronchus	25.8
Colorectal	10.8
Prostate	7.0
Female breast	7.0
Pancreas	5.4
Leukemia	4.2
Non-Hodgkin lymphoma	3.5
Ovary	3.4
Brain and ONS	2.6
Bladder	2.5

Figure 8: Leading sites of cancer cases and deaths, South Dakota males 2002

Site	Cases	Deaths
Prostate	673	109
Lung & bronchus	270	236
Colorectal	266	78
Bladder	174	27
Non-Hodgkin lymphoma	75	29
Kidney & renal pelvis	70	18
Melanoma	69	11
Thyroid	69	2
Brain	33	24
Pancreas	32	37

The top four cancers for both sexes were prostate, female breast, colorectal and lung and bronchus accounting for 57% of all invasive diagnosed and 51% of all cancer deaths.

Figure 9: Leading sites of cancer cases and deaths, South Dakota females 2002

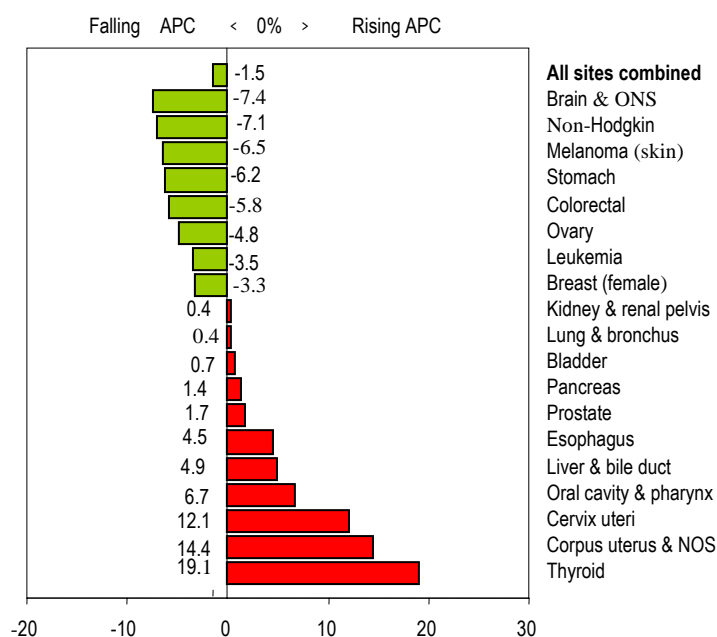| Site	Cases	Deaths
Female breast	573	109
Colorectal	243	91
Lung & bronchus	174	166
Corpus uteri	140	8
Non-Hodgkin lymphoma	70	25
Melanoma	54	5
Thyroid	52	4
Ovary	51	53
Bladder	40	12
Kidney & renal pelvis	39	16
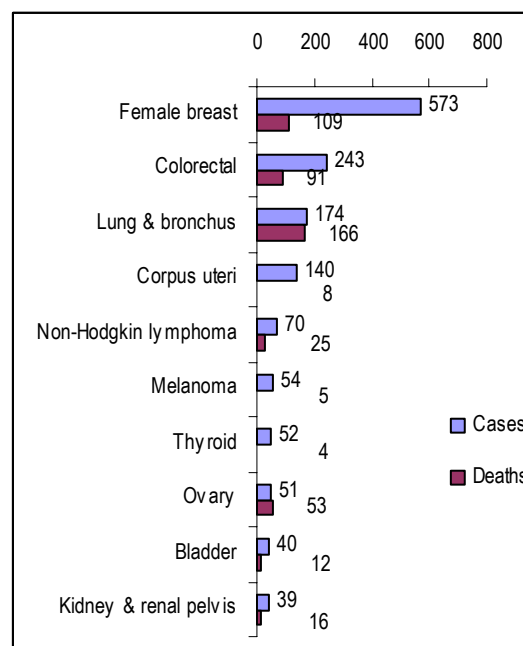
(Figures 6 and 7). Prostate and breast cancers lead the gender specific cancers (Figures 8 and 9).
Lung and bronchus cancers were the second leading cancer for men and the third for women.

TRENDS IN DEATH RATES (ANNUAL PERCENT CHANGE)

Overall cancer age-adjusted death rates decreased during the period 1998-2002 with a statistically stable -1.5 Annual Percent Change (APC) with confidence intervals -3.4, 0.5. Figure 8 shows trends of selected sites.   All other cancer sites had confidence intervals containing zero, hence the APC is considered stable whether positive or negative.

Figure 10: Trends in death rates for selected cancer sites, all races, South Dakota, 1998-2002

	APC	Cancer Site
Falling APC < 0% > Rising APC		
	-1.5	**All sites combined**
	-7.4	Brain & ONS
	-7.1	Non-Hodgkin
	-6.5	Melanoma (skin)
	-6.2	Stomach
	-5.8	Colorectal
	-4.8	Ovary
	-3.5	Leukemia
	-3.3	Breast (female)
	0.4	Kidney & renal pelvis
	0.4	Lung & bronchus
	0.7	Bladder
	1.4	Pancreas
	1.7	Prostate
	4.5	Esophagus
	4.9	Liver & bile duct
	6.7	Oral cavity & pharynx
	12.1	Cervix uteri
	14.4	Corpus uterus & NOS
	19.1	Thyroid

Tables 12: Trends in death rates by gender, South Dakota, 1998-2005

Males

Cancer Site	APC
All Cancer Sites	-1.2
Non-Hodgkin Lymphoma	-8.3
Kidney & Renal Pelvis	-5.7
Colorectal	-4.2
Pancreas	-3.7
Bladder	-3
Stomach	-2.3
Leukemia	-1.7
Brain & ONS	-1.1
Lung & Bronchus	0.1
Melanoma (skin)	0.8
Prostate	1.7
Esophagus	2.5
Liver & Bile Duct	3.4
Oral Cavity & Pharynx	5.9
Thyroid	17

Females

Cancer Site	APC
All Cancer Sites	-1.9
Melanoma (skin)	-16.4
Brain & ONS	-12.7
Stomach	-12.1
Colorectal	-7.5
Non-Hodgkin lymphoma	-6.9
Leukemia	-6.4
Ovary	-4.8
Breast (female)	-3.3
Lung & bronchus	0.5
Oral cavity & pharynx	0.5
Pancreas	5.4
Liver & bile duct	5.9
Esophagus	8.1
Cervix	12.1
Bladder	12.6
Kidney & renal pelvis	14.4
Corpus Uterus & NOS	14.4
Thyroid	22.3

Source: Figure 10 and Table 12
South Dakota Department of Health

Cancer in South Dakota 2002

YEARS OF POTENTIAL LIFE LOST

Years of Potential Life Lost (YPLL) is a measure of premature mortality and provides a more accurate measure of deaths among younger age groups while death rates measure disease burden among older persons

YPLL is measured using a cut-off of 75 years. A person dying at age 35 would have 40 years of life lost. Lost productivity due to an individual dying prematurely of cancer involves both economic and non-economic societal costs.

Heart disease was the leading cause life lost in the United States in 1980. However, cancer took over a decade later and in 2002, the age-adjusted YPLL was 1,622.7 years for cancer and 1212.7 per 100,000 persons for heart disease.[5]

Actual YPLL calculations without age-adjusting showed 9,977 years for cancer, accidents 9,861 years and 7,522 years for heart disease. Lung and bronchus cancers lead with 2,295 YPLL for whites and 189 years for American Indians (Figures 11 and 12).
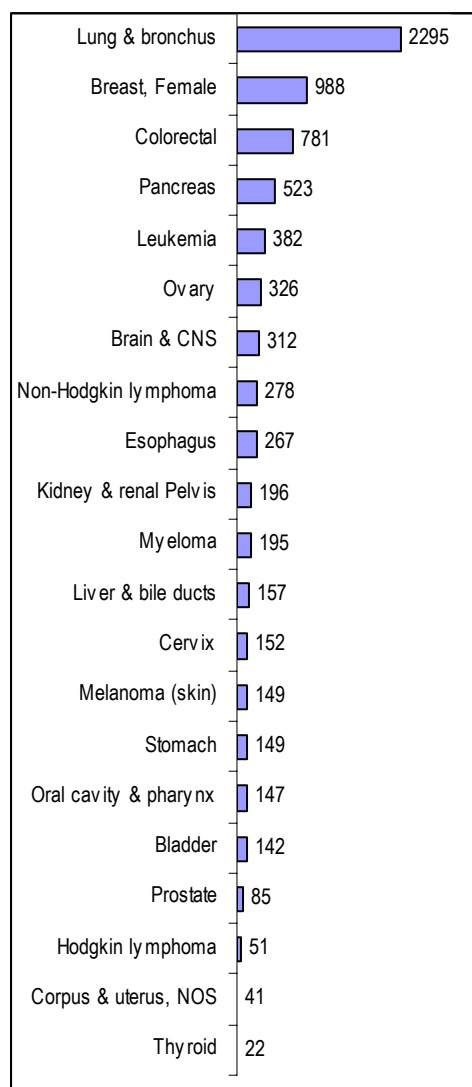
Table 13: Ten leading cause of age-adjusted years of potential life lost, South Dakota 1988-2002

Cause of Death	Race		
	Total	White	American Indian
Cancer	1,482	1,469	1,894
Accidents	1,402	1,104	4,360
Heart Disease	1,087	989	2,672
Cerebrovascular Diseases	196	172	575
Diabetes	182	133	1,066
Chronic Lower Respiratory Diseases	148	146	208
Influenza and Pneumonia	93	60	450
Nephritis, Neph. Synd, and Nephrosis	48	33	239
Alzheimer's Disease	8	8	10
All other causes	2,461	1,973	7,931
Total	7,107	6,088	19,406

Rates are per 100,000 age-adjusted to the 2000 standard population
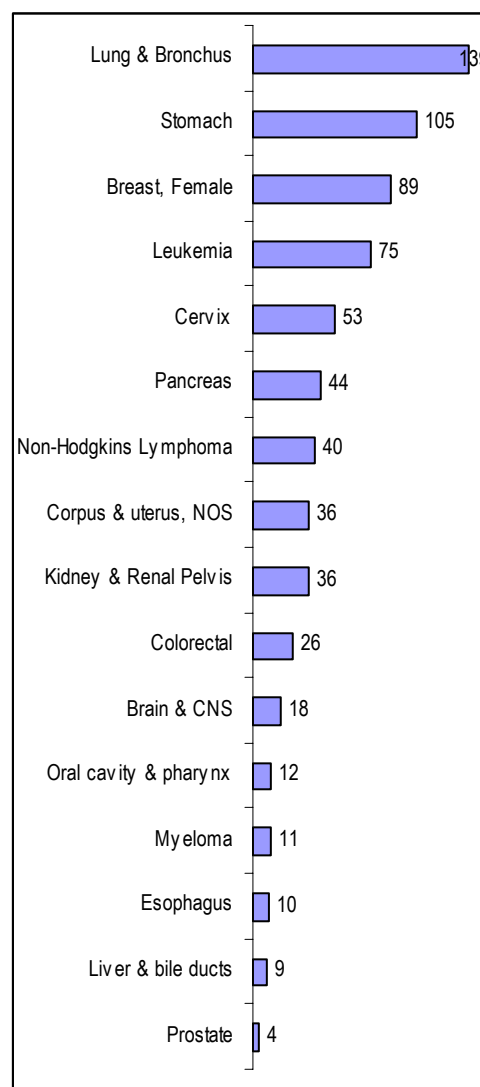Source: South Dakota Department of Health

---

[5] Health, United States 2004: Page 146

**Figure 11: Years of Potential Life Lost
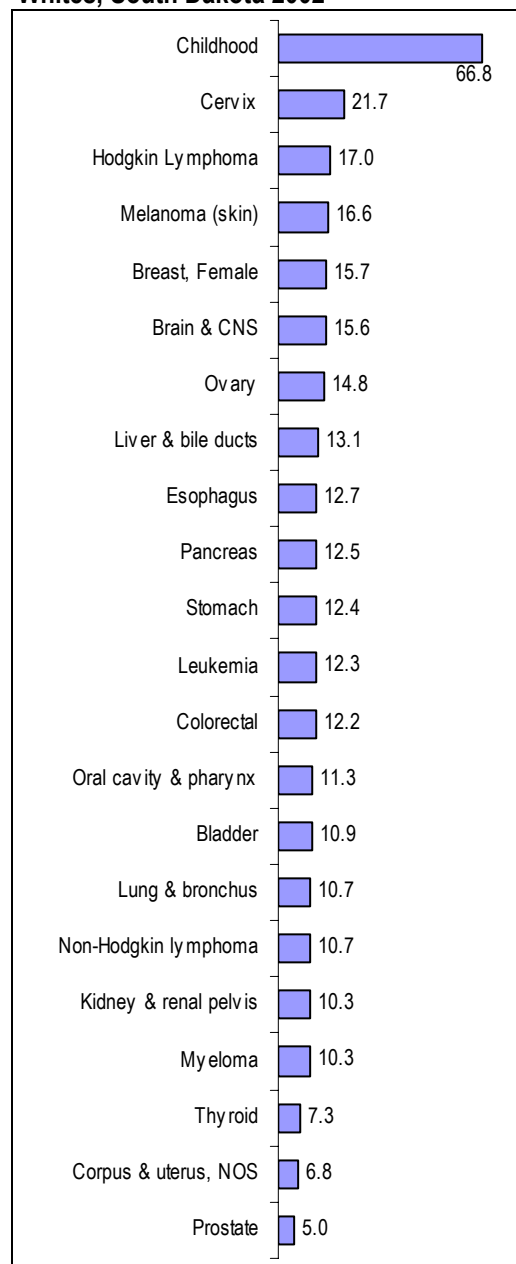Whites, South Dakota 2002**

Cancer Site	Years
Lung & bronchus	2295
Breast, Female	988
Colorectal	781
Pancreas	523
Leukemia	382
Ovary	326
Brain & CNS	312
Non-Hodgkin lymphoma	278
Esophagus	267
Kidney & renal Pelvis	196
Myeloma	195
Liver & bile ducts	157
Cervix	152
Melanoma (skin)	149
Stomach	149
Oral cavity & pharynx	147
Bladder	142
Prostate	85
Hodgkin lymphoma	51
Corpus & uterus, NOS	41
Thyroid	22

Source: South Dakota Department of Health

**Figure 12: Years of Potential Life Lost
American Indians, South Dakota 2002**

Cancer Site	Years
Lung & Bronchus	139
Stomach	105
Breast, Female	89
Leukemia	75
Cervix	53
Pancreas	44
Non-Hodgkins Lymphoma	40
Corpus & uterus, NOS	36
Kidney & Renal Pelvis	36
Colorectal	26
Brain & CNS	18
Oral cavity & pharynx	12
Myeloma	11
Esophagus	10
Liver & bile ducts	9
Prostate	4

Source: South Dakota Department of Health

Cancer in South Dakota 2002

AVERAGE YEARS OF LIFE LOST

Figure 13: Average years of life lost Whites, South Dakota 2002

Cancer	AYLL
Childhood	66.8
Cervix	21.7
Hodgkin Lymphoma	17.0
Melanoma (skin)	16.6
Breast, Female	15.7
Brain & CNS	15.6
Ovary	14.8
Liver & bile ducts	13.1
Esophagus	12.7
Pancreas	12.5
Stomach	12.4
Leukemia	12.3
Colorectal	12.2
Oral cavity & pharynx	11.3
Bladder	10.9
Lung & bronchus	10.7
Non-Hodgkin lymphoma	10.7
Kidney & renal pelvis	10.3
Myeloma	10.3
Thyroid	7.3
Corpus & uterus, NOS	6.8
Prostate	5.0

Source: South Dakota Department of Health

Figure 14: Average years of life lost American Indians, South Dakota 2002

Cancer	AYLL
Childhood	71.0
Cervix	53.0
Non-Hodgkin lymphoma	40.0
Leukemia	37.5
Corpus & uterus, NOS	36.0
Stomach	26.3
Breast, Female	22.3
Pancreas	22.0
Kidney & renal pelvis	18.0
Lung & bronchus	12.6
Esophagus	10.0
Brain & CNS	9.0
Liver & bile ducts	9.0
Colorectal	8.7
Oral cavity & pharynx	6.0
Myeloma	5.5
Prostate	4.0
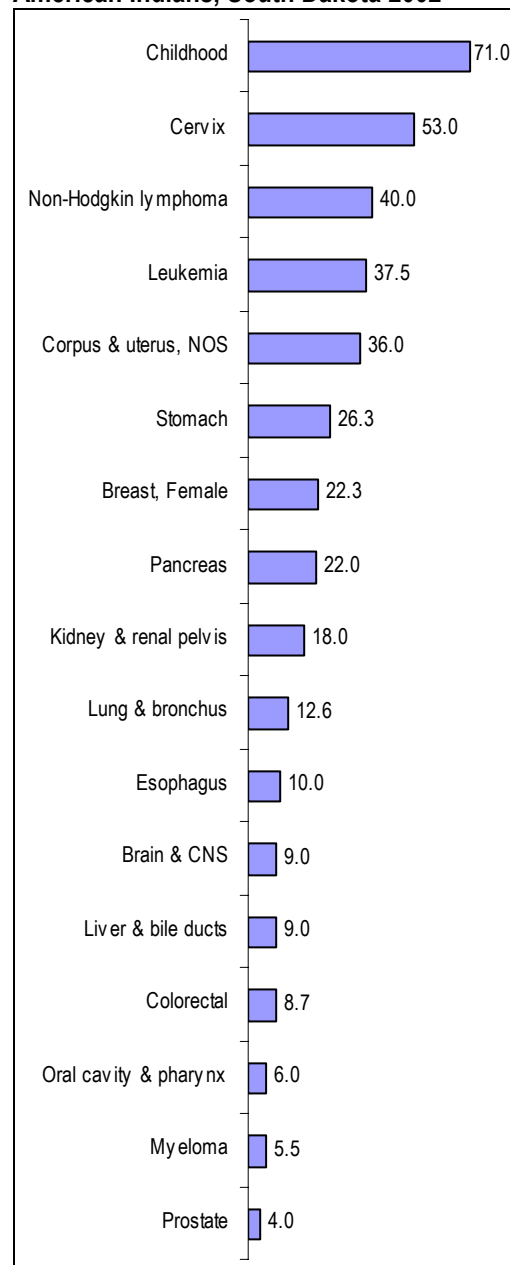
Source: South Dakota Department of Health

Childhood cancers will always have the most AYLL. In 2002 after childhood cancers, American Indians had much higher AYLL for their top 7 cancers: cervical, non-Hodgkin lymphoma, leukemia, endometrial, stomach, female breast and pancreatic cancers compared to AYLL for cancers among South Dakota's white population. American Indians are dying from many cancers at a much younger age than the white population.

Cancer in South Dakota 2002

DISEASE SEVERITY

The mortality to-incidence (M/I) ratio or the case fatality ratio provides a measure of disease severity. In general, the closer a M/I value is to 1.0 the worse is the expected outcome.   An M/I value over 1.0 represents the poorest prognosis. This means that more people die from a particular type of cancer than were diagnosed in the same year.

The overall M/I ratio for 2002 in South Dakota was 0.4 for all cancer sites. Cancers of the liver and intrahepatic bile duct had the highest M/I of all cancers with 2.1 and a female rate more than twice the male rate. Fortunately, the more common cancers by gender: Prostate for males and breast for females, had a M/I of 0.4. It is also indicative of the early detection of these two cancers.

Table 14: Mortality/Incidence ratios, South Dakota 2002

Selected Sites	Total	Male	Female
All sites	0.4	0.4	0.4
Liver and Intrahepatic Bile Duct	2.1	1.6	3.5
Pancreas	1.4	1.2	1.6
Ovarian	1.0	n/a	1.0
Multiple Myeloma	1.0	1.1	1.0
Brain and Other Nervous Sys.	0.9	0.7	1.5
Lung and Bronchus	0.9	0.9	1.0
Esophagus	0.9	1.0	0.5
Soft Tissue (Including Heart)	0.8	1.2	0.6
Leukemias	0.8	0.8	0.7
Hodgkin Disease	0.7	0.8	0.5
Stomach	0.7	0.7	0.7
Mesothelioma	0.7	0.8	0.0
Small Intestine	0.5	0.5	0.5
Cervix Uteri	0.4	n/a	0.4
Non-Hodgkin Lymphomas	0.4	0.4	0.4
Colorectal	0.3	0.3	0.4
Kidney and Renal Pelvis	0.3	0.3	0.4
Oral Cavity & Pharynx	0.3	0.3	0.3
Breast	0.2	0.0	0.2
Prostate	0.2	0.2	n/a
Melanomas Skin	0.1	0.2	0.1
Corpus and Uterus, NOS	0.1	n/a	0.1
Bladder	0.1	0.1	0.1
Thyroid	0.1	0.1	0.1

n/a not applicable
Source: South Dakota Department of Health

SCREENABLE CANCERS

Cancers detected at an early stage are more likely to be cured but there are only a few types of cancers which have screening protocols that have been effective in reducing mortality among asymptomatic persons with average risks of developing the disease. Routine screening is recommended for female breast, cervix and colorectal cancers. The American Cancer Society (ACS) suggests that men age 50 and older should discuss prostate cancer with their doctors. Everyone should have a cancer related screening between ages 20-29 every three years, and annually after 40 years of age. Symptomatic persons should seek prompt care for an earlier diagnosis.

The success of population-based screening efforts in public health can be measured by the percentage of early stage diagnoses. The percentage of early stage diagnosis often used as a proxy for success in population based screening. Figure 15 shows that the percent of early diagnoses has increased from 2000 to 2002 whereas the percentage of early stage cancers diagnosed have increased for female breast and colorectal cancers. Figure 16 shows that the inverse (decrease) occurred with the age-adjusted death rates. Rates for cervical and prostate cancers increased while rates for breast and colorectal cancers decreased. It is likely that the decreases in mortality might be due to a combination of improvements in both screening and treatment.

South Dakota's Behavioral Risk Factor Surveillance System (BRFSS), 1995-2004 shows increases in screening rates for breast and colorectal cancers and decreases for prostate and cervical cancers. (Figures 17-19).

The South Dakota Breast and Cervical Early Detection Program (BCCCP) began in 1997. Trends show an increase in screening rates in South Dakota probably due to the inception of the program increasing access to low income women, availability statewide

by other facilities and general awareness by both women and providers.

Figure 15: Screenable cancers, percentage of early stage diagnosis, South Dakota 2000, 2002
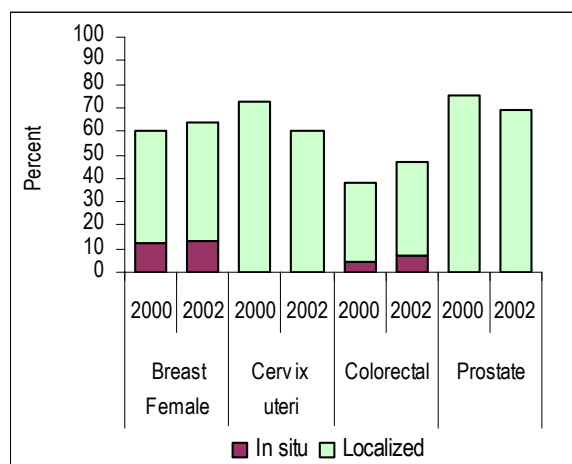
Age-adjusted to the 2000 U.S. standard population
Source: South Dakota Department of Health

Figure 16: Screenable cancers, age-adjusted death rates by race, South Dakota 2001, 2002
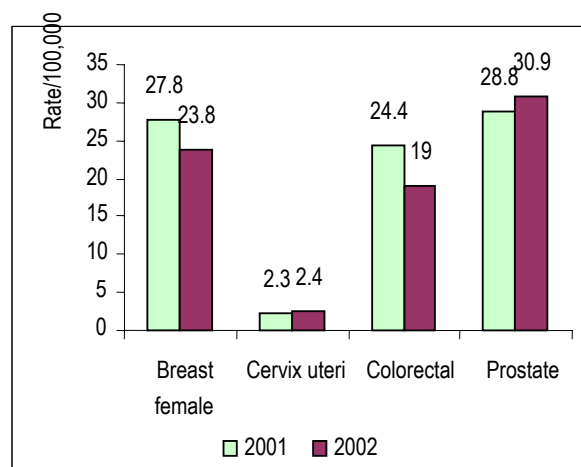
Age-adjusted to the 2000 U.S. standard population
Source: South Dakota Department of Health
Note: Cervical cancer *in situ* (CIS) is not reportable to the SDCR.

BRFSS data[6] is presented on page 27.

---

[6] BRFFS online

Cancer in South Dakota 2002

Mammograms

Female respondents, age 40 and older, who reported that they had a mammogram within the past two years was 76% in 2004 (Figure 17).

Healthy People 2010 Objective 3-13:
Increase the proportion of women aged 40 years and older who have received a mammogram within the preceding 2 years

Pap Smears

Female respondents, with uterine cervix, age 18 and older, who report that they had a Pap smear within the last three years was 87.2% in 2004(Figure 18).

Healthy People 2010 Objective 3-11: Increase the proportion of women aged 18 years and over who a) ever received a Pap test to 97% and b) received a Pap test within the preceding 3 years to 90%.

Colorectal cancer

Adults aged 50+ who have ever had a sigmoidoscopy or colonoscopy was 50.2% in 2004 (Figure 19).

Adults aged 50+ who have had a blood stool test within the past two years was 24% in 2004.

Healthy People 2010 Objective 3-12:
a. Increase the proportion of adults who receive a fecal occult blood test (FOBT) within the preceding 2 years to 50%.
b. Increase the proportion of adults who receive sigmoidocsopy or colonoscopy within the preceding 2 years to 50%.

Prostate cancer

Men age 40 and over who had a PSA within the past 2 years was 53% in 2004 (Figure 19)

There are no Healthy People 2010 objectives for prostate cancer because there are no clear screening guidelines.

Figure 17: Trends in mammography screening*
South Dakota 1995-2004
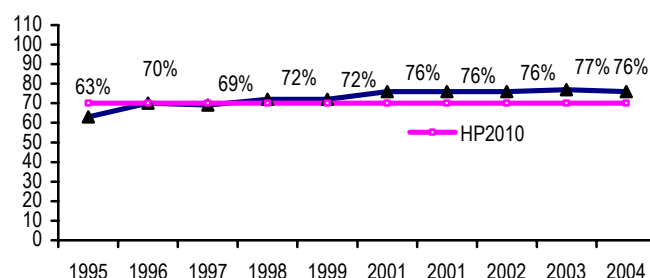
* Women age 40 and older

Figure 18: Trends in Pap screening*
South Dakota 1995-2004
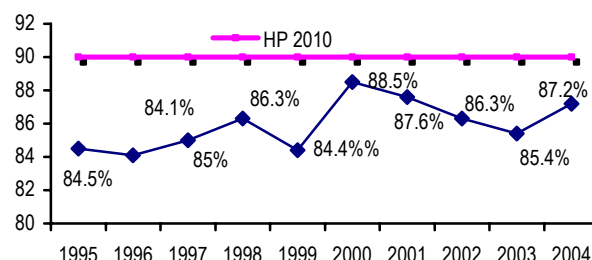
*Women with intact uterus aged 18 and over

Figure 19: Trends in colorectal cancer screening*
South Dakota 1995-2004
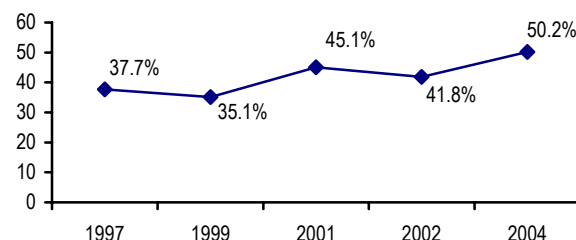
*Percentage who **ever** had a sigmoidoscopy or colonoscopy. Approximately   62-65 % of those who were screened from 1999 -2004 were screened within the preceding two years of the survey.

RACE AND ETHNICITY
_____

Only white and American Indian rates are presented here because other race/ethnic groups, viz., blacks, Asians/Pacific Islanders and Hispanics constituted approximately 1% of the population each in South Dakota. Counts for these groups are too low to generate rates that are meaningful.

Incidence rates for American Indians in South Dakota were lower than those for whites in 2001-2002. These rates include any corrections after linkage with Indian Health Service data to correct any misclassification of American Indians.

The top 4 cancers are similar for whites and American Indians with just slight differences in ranking. This occurs with both cases and deaths (Tables 15, 16).

Table 15: Top five most common cancers by race, percentage of incidence, South Dakota 2001-2002

Whites			American Indian
	Incidence		
Prostate	18%	15%	Prostate
Breast (female)	16%	14%	Lung & bronchus
Colorectal	12%	13%	Breast (female)
Lung & bronchus	12%	11%	Colorectal
Bladder	5%	3%	Endometrial

Source: South Dakota Department of Health

Table 16: Top five most common cancer deaths by race and percentage of deaths, South Dakota 2002

Whites			American Indian
	Incidence		
Lung & bronchus	26%	27%	Lung & bronchus
Colorectal	11%	9%	Colorectal
Prostate	7%	9%	Stomach
Breast (female)	7%	4%	Breast (female)
Pancreas	5%	4%	Prostate

Source: South Dakota Department of Health

Incidence rates for American Indians in South Dakota were lower than those for whites in 2001-2002. These rates include any corrections after linkage with Indian Health Service (IHS) data to correct any misclassification of American Indians (Figure 20).

On the other hand American Indians had higher age-adjusted deaths rates than South Dakota's and the white population (Figure 21). The mortality data files were not linked with IHS files to identify misclassification of American Indians.

Figure 20: All cancers combined incidence rates by race, South Dakota 2001-2002
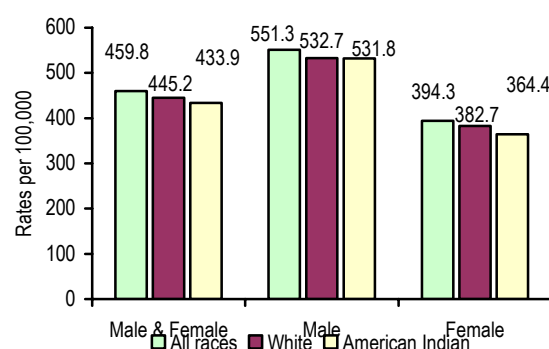
Note: Rates are age-adjusted to the 2000 U.S. standard population
Source: South Dakota Department of Health

Figure 21: All cancers combined death rates by race, South Dakota, 1998-2002
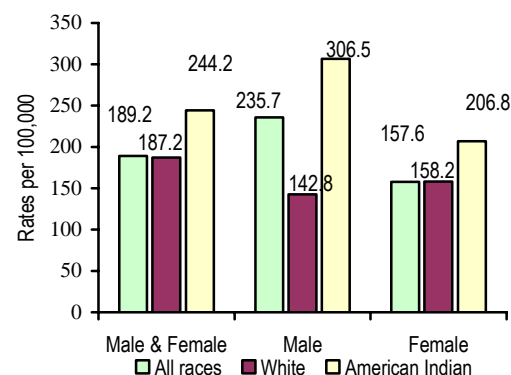
Note: Rates are age-adjusted to the 2000 U.S. standard population
Source: South Dakota Department of Health

AGE AND CANCER

_____

Generally, the older one is the more likely one might be diagnosed with cancer. Although cancer strikes both young and old, it is primarily a disease of aging. In the United States, 50 percent of all malignancies and 67 percent of cancer deaths occur in persons over the age of sixty-five. (That's currently one American in eight; by the year 2030, it's expected to be one in five.) Age is a risk factor that one cannot change when looking at cancer prevention.

The distribution of new cancer cases and deaths for all sites during 2002 are in Figure 23 and cancer rates by age are in Figure 24. Cancer incidence began to rise at age 40 and peaked at 70-79 age-group. Deaths began to rise at age 40 and continued in this direction through all age-groups. Age-specific rates are not age adjusted and are considered crude rates per 100,000 events. The 2002 crude rates for all cancer sites combined were:

Crude incidence rate = 511.9 cases per 100,000 persons
Crude death rate = 206.8 deaths per 100, 000 persons

Figure 22: All sites cancer cases and deaths by age groups in South Dakota, 2002
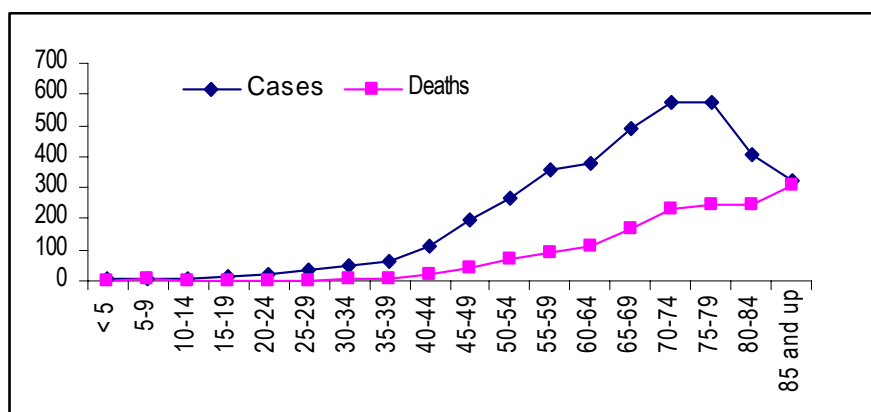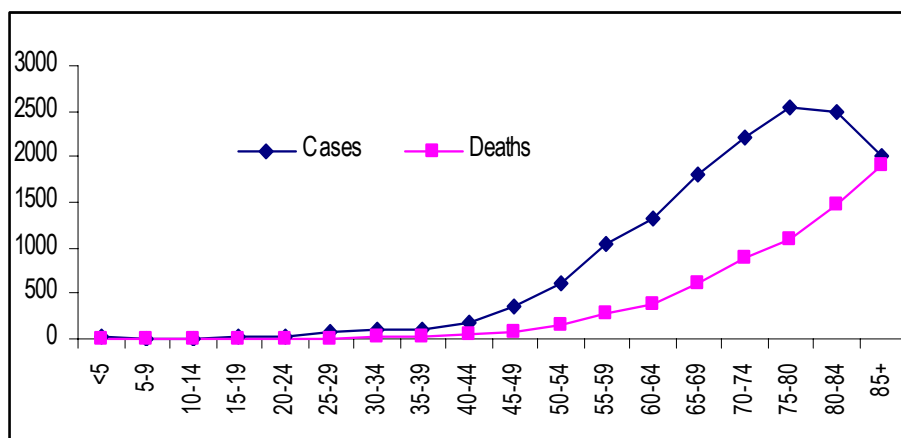

Figure 23: All sites age- specific incidence and mortality in South Dakota, 2002

Note: Rates are per 100,000 persons: Source: South Dakota Department of Health

VI. SELECTED CANCER SITES INCIDENCE & MORTALITY
_____

This section covers the following cancers:

-bladder, female breast, cervix uteri, childhood cancers, colorectal cancer, corpus uterus, kidney and renal pelvis, lung and bronchus, leukemia, melanoma, myeloma, non-Hodgkin lymphoma, oral cavity and pharynx, ovary, pancreas, prostate, stomach and thyroid.

These cancers were selected because of the ranking in the cancer sites reported as well as their importance on their impact to society. Childhood cancers were included as a group because cancers affect children differently and in South Dakota, their numbers are low. A child who dies from cancer is a tremendous loss, not only to family and friends but in economic and societal costs.

Topics for each cancer include incidence and mortality data including age-specific rates, trends, comparison with national data, risk and associated risk factors, prevention.

BLADDER
South Dakota 2002

Incidence and Mortality Summary

	Total	Males	Females
Number of invasive cases	214	174	40
Number of *in situ* cases	85	72	13
South Dakota incidence rate[+]	25.7	48.8▲	8.4
United States incidence rate*	19.8	34.6	9.0
Number of deaths	38	26	12
South Dakota death rate[+]	4.2	7.3	2.3
United States death rate*	4.4	7.5	2.3

Rates are per 100,000 persons, age-adjusted to the 2000 U.S standard pop.
Rates include *in situ* cases.
▲ Rate is significantly higher than U.S. rate
Source: + South Dakota Department of Health
          * *SEER Cancer Statistics Review 1975-2002*

Bladder cancer stage at diagnosis
South Dakota, 2002
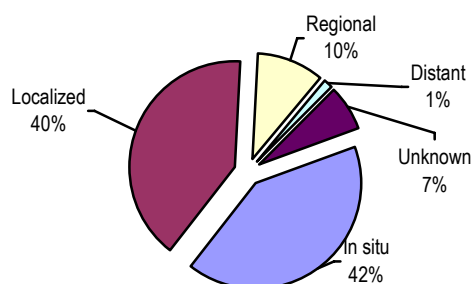
Source: South Dakota Department of Health

Descriptive Epidemiology

Incidence: Cancers of the urinary bladder were the fifth most frequent cancer with 5.5% of cancers reported. A total of 214 cases were observed, including 84 carcinoma *in situ* (CIS)[7] of the bladder, which are included to calculate rates. Rates increased sharply with age, beginning at age 50 at ages 80-84. The highest number of cases was at ages 75-79 years old. In 2002, incidence rate peaked among the 65-69 age-group. Men were affected 4.3 times as often as women. Only 4 cases of bladder cancer were observed among American Indians, 2 males and 2 females.

---

[7] CIS of the bladder is a highly malignant, aggressive neoplasm. It is a diffuse heterogeneous disease and prior to the use of the Bacillus-Calmette-Guerin (BCG) immunotherapy, 54 percent progressed to muscle invasive or metastasis within five years. Before medical advances leading to improved surgical procedures and immunotherapy, as high as 90 percent of CIS patients had tumor recurrence.

Stage at diagnosis: Most cases were diagnosed at localized or *in situ* stages, when treatment yields better results than if diagnosed at later stages.

Mortality: The death rate for 2002 was similar to the national rate. For the five-year period 1998-2002, trends showed an increase of 0.5 percent change (PC) and a 0.7 annual percent change (APC) for all races. The death rates for whites decreased overall by 1.6% in 5 years, decreased -15.3% for males and increased by 67.2% for females. Only 1 American Indian died from bladder cancer, therefore the numbers are too low to calculate meaningful PC and APC. Peak deaths were at 85 plus and the peak death rate was at the 80-84 age group.

The mortality/incidence ratio in 2002 was 0.18 overall with 0.15 for males and 0.3 for females

Risks and Associated Factors

Cigarette smoking accounts for 50 percent of bladder cancers in men and 25 percent in women with an average of 20 years between exposure and diagnosis. Associated risk factors include occupational exposure to aniline dyes, benzene or 2-napthalene, chronic infections such as *Schistosoma haematobium*, and calculus, and diets low in fruits and vegetables.
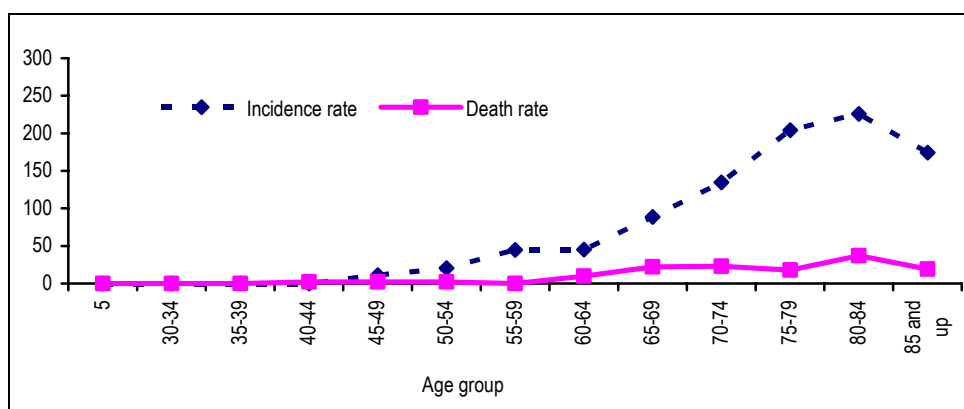
Early Detection and Prevention

There is no specific prevention except to stop smoking. Screening tests are neither available nor recommended for the general population.

**Figure 24: Bladder cancer cases and deaths by age,
South Dakota 2002**
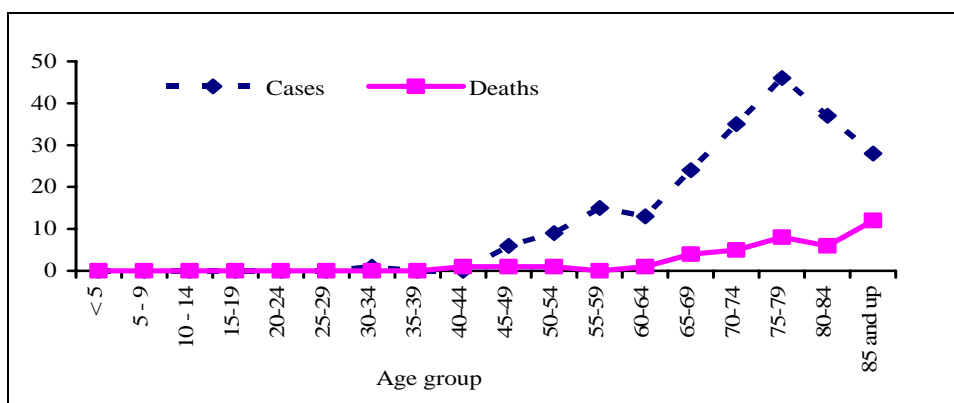
Source: South Dakota Department of Health

**Figure 25: Bladder age-specific incidence and death rates,
South Dakota 2002**

Note: Rates are per 100,000 persons
Source: South Dakota Department of Health

**Table 17: Bladder age-adjusted death rates by race,
South Dakota and United States, 2002 and 1998-2002**

	2002			1998-2002		
	Total	White	American Indian	Total	White	American Indian
South Dakota +	4.2	4.5	§	3.8	3.8	§
United States *	4.4	7.5	2.3	4.4	4.5	1.7

§ Number of deaths too low to calculate rates.
Note: Rates are per 100,000 persons, age-adjusted to the 2000 U.S. standard population.
Source: + South Dakota Department of Health; * *SEER Cancer Statistics Review 1975-2002*

BREAST (FEMALE)
South Dakota 2002

cidence and Mortality Summary

	Females
Number of invasive cases	573
Number of *in situ* cases	89
South Dakota incidence rate+	139.0
United States incidence rate*	129.9
Number of deaths	109
South Dakota death rate+	23.8
United States death rate*	25.5
Healthy People 2010 Objective	**22.3**

Rates are per 100,000 persons, age-adjusted to the 2000 U.S.
Standard population
Source: +South Dakota Department of Health
SEER Cancer Statistics Review 1975-2001

Female breast cancer stage at diagnosis
South Dakota, 2002
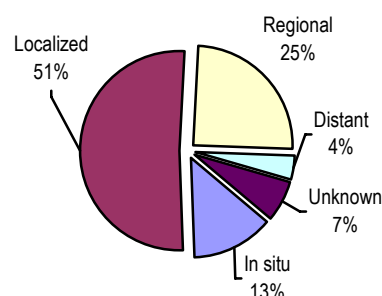
Source: South Dakota Department of Health

Descriptive Epidemiology

Incidence: Female breast cancer[8] was the leading cancer diagnosis for women and the second most common malignancy diagnosed in South Dakota with 573 invasive cases accounting for 15 percent of all cancer cases. Of the 573 invasive cases, 530 women were white with an age-adjusted incidence rate of 136.1 and 28 were American Indian with a rate of 146.9 cases per 100,000 women. Seventeen women were diagnosed with breast cancer before age 40 and 19% or 108 women were diagnosed before age 50.

Stage at diagnosis*:* Sixty-four percent of all cases were at *in situ* and localized stages, 52% for white women and 61% for American Indian

Mortality: Breast cancer was the third most common cause of cancer deaths in South Dakota during 2002 with 109 deaths and seven percent of cancer deaths. It was the second leading cause of death for South Dakota women. White women accounted for 104 deaths and 4 were American Indian women. The five-year trends, 1998-2002, in death rates show declining rates with a P.C. of -7.8 for all races, - 7.5 for whites and - 40.0 for American Indian women in South Dakota. Trends also show an annual percent change (APC) of –3.3 for all races, -2.4 for whites and -6.5 for American Indian women.

The mortality/incidence ratio was 0.19 for all women, .20 for whites and .04 for American Indian women.

**Risk and Associated Factors**

Known risk factors account for only 30 to 50 percent of breast cancers. Early onset of menarche, late onset of menopause, never being pregnant, first full term pregnancy after age 30 and fewer children increase risk because of cumulative exposure of breast tissue to estrogen. Other risk factors include high fat diets, obesity, alcohol consumption, history of fibrocystic disease, having a mother or sister with breast cancer, a history of ovarian cancer or endometrial cancer, and specific tumor suppressor genes such as BRCA1 and BRCA2. White women in high socioeconomic groups have increased risks.

Early Detection and Prevention

Early detection and treatment remain the only effective methods for preventing breast cancer deaths. Periodic mammograms and clinical breast examination by a trained health care professional offer substantial benefit in detecting tumors early in their development, when they are extremely small in size and without symptoms. Early diagnosis allows for more treatment options and improves overall survival and quality of life.

---

[8] There were 6 cases of male breast cancer and no deaths in 2002.
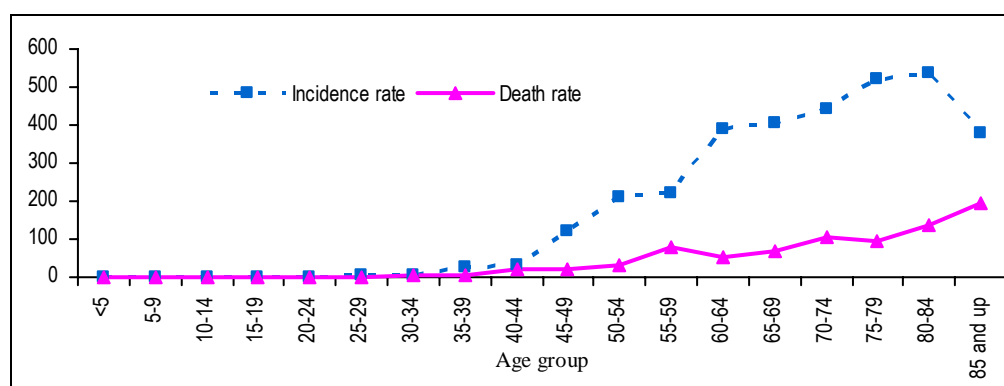
**Figure 26: Breast (female) cancer cases and deaths,
South Dakota 2002**
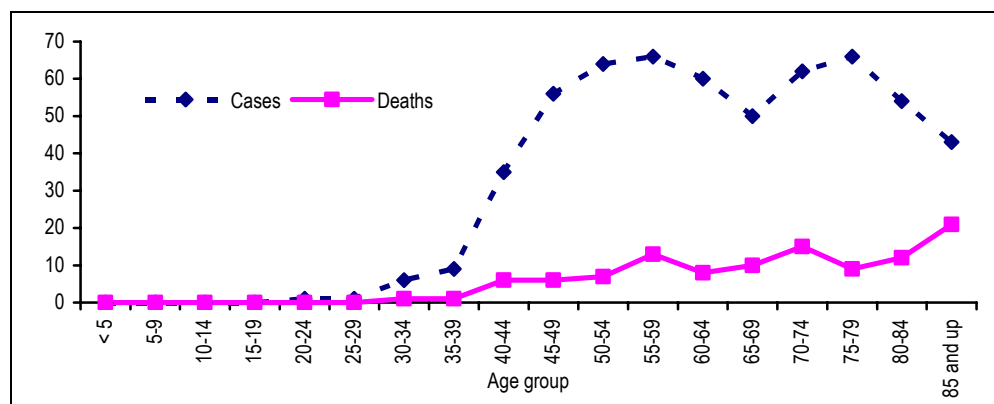
Source: South Dakota Department of Health

Incidence peaks were at 55-59 and 75-79 age-groups with a rate peak at 80-84 years. Deaths peaked at the 55-59 and 70-74 age groups. Death rates increased with age.

**Figure 27: Breast (female) age-specific cancer incidence and death rates,
South Dakota 2002**

Note: Age-specific rates are per 100,000 women; Source: South Dakota Department of Health

**Table 18: Breast (female) age-adjusted death rates by race,
South Dakota and United States, 2002 and 1998-2002**

	2002			1998-2002		
	Total	White	American Indian	Total	White	American Indian
South Dakota +	23.8	23.6	18.7	23.8▼	23.6	18.2
United States *	25.5	24.9	13.9	26.4	25.9	13.8

Note: Rates are per 100,000 persons, age-adjusted to 2000 U.S. standard population.
▼ rate is significantly lower than the national five year rate
Source: + South Dakota Department of Health; * *SEER Cancer Statistics Review 1975-2002*

CERVIX UTERI
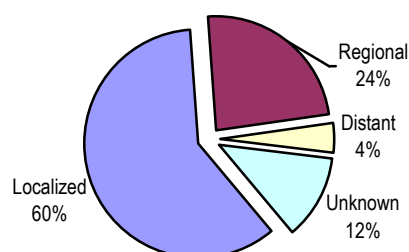**South Dakota 2002**

Incidence and Mortality Summary

	Females
Number of invasive cases	25
South Dakota incidence rate+	7.1
United States incidence rate*	8.2
Number of deaths	10
South Dakota death rate+	2.4
United States death rate*	2.5
Healthy People 2010 Objective	**2.0**

Rates are per 100,000 persons, age-adjusted to the 2000 U.S. standard
+ Source: South Dakota Department of Health
* *SEER Cancer Statistics Review 1975-2002*

Cervix uteri stage at diagnosis
South Dakota, 2002

Source: South Dakota Department of Health

Descriptive Epidemiology

Incidence: Invasive cervical cancer accounted for approximately one percent of new cancer cases. There were 27 cases, of which 17 were white, 1 other race and 7 American Indian women. The median age for cervical cancer was one of the youngest with over 60 percent of cases under 50 years old. The SDCR does not collect carcinoma *in situ* (CIS) or cervical intraepithelial neoplasia (CIN III) of the cervix.

Stage at diagnosis: Sixty percent of all cases were diagnosed at localized stages compared to 53 percent in 2002.

Mortality: Cervical cancer accounted for less than one percent of cancer deaths with a total of 10 deaths, 1 American Indian and 9 white women. There was no difference among age-adjusted death rates for American Indian women, white and the South

Dakota rate, which were all 2.4 cases per 100,000 women. The most deaths occurred in the 60-64 and over 85 age groups. Overall the trend in the five-year mortality rate annual percent change (APC) of -3.3 percent for South Dakota and an increase for whites with an APC of 3.9. Death counts for American Indian rates have been too low to calculate trends. Deaths have been unstable ranging from 0 to 6 per year over the last decade. The absolute numbers of cervical cancer deaths vary too much from year to year to give meaningful percent changes.

The mortality/incidence ratio was 0.3 for all women in South Dakota, 0.26 for white women and 1.5 for American Indian women.

Risk and Associated Factors

Infection with Human Papilloma Virus (HPV) is a primary risk factor. There are approximately 30 types of HPV viruses and 15 are associated with cervical cancer. HPV-16 is the type most commonly found in precancerous and cancerous lesions, followed by HPV-18. In fact HPV-16 and 18, along with 11 other virus types, are responsible for 90 percent of HPV infections that result in HSIL, severe changes in cells lining the cervix, and cervical cancer.

Smoking, intercourse at an early age, multiple sexual partners, HIV, and other sexually transmitted diseases are known risk factors. Smoking is considered an associated risk factor.

Early Detection and Prevention

Regular use of Pap testing reduces deaths from cervical cancer. Women who have not been screened face a three-to 10-fold higher risk of developing invasive cervical cancer. Cure rates are nearly 100 percent when diagnosed at the pre-invasive stage. Screening should begin about three years after a woman begins having sexual intercourse or no later than 21 years old. Older, poor, less educated women and new immigrant women are less likely to be screened.
They are at a greater risk of dying as well.

**Figure 28: Cervix uteri cancer cases and deaths,
South Dakota 2002**
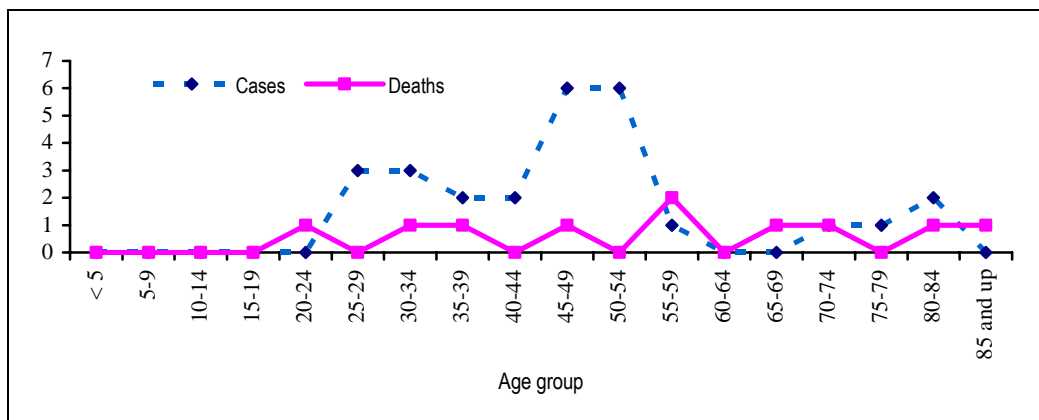
Source: South Dakota Department of Health

There were a few cases and deaths at very young ages in 2002. The most cases occurred among the 45-54 age group and the most deaths occurred in the 55-59 age-group. Rates are difficult to analyze because of few number of cases and deaths.

**Figure 29: Cervix uteri age-specific incidence and death rates,
South Dakota 2002**
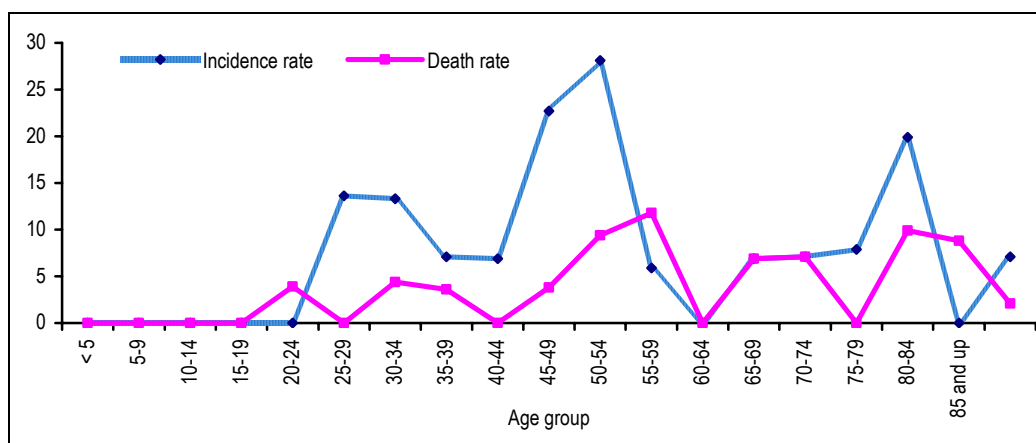
Rates are per 100,000 persons
Source: South Dakota Department of Health

**Table 19: Cervix uteri age-adjusted death rates by race,
South Dakota and United States, 2002 and 1998-2002**

	2002			1998-2002		
	Total	White	American Indian	Total	White	American Indian
South Dakota +	2.4	2.4	2.4	2.0	1.8	8.0
United States *	2.5	2.3	3.0	2.8	2.5	2.6

Note: Rates are per 100,000 persons, age-adjusted to 2000 U.S. standard population
Source: + South Dakota Department of Health   * SEER Cancer Statistics Review 1975-2002

CHILDHOOD CANCERS (ages 0-19)
South Dakota, 2002

Incidence and mortality summary

	Total	Male	Female
Number of invasive cases	30	22	8
South Dakota incidence rate	13.2	18.8	7.2
United States incidence rate	16.2	17.2	15.1
Number of deaths	6	3	3
South Dakota death rate+	2.6	2.6	2.7
United States death rate*	2.8	3.1	2.5

Note: Rates are per 100,000, age-adjusted to the 2000 standard pop
+ Source: South Dakota Department of Health
* *SEER Cancer Statistics Review 1975-2002*

Childhood cancers by percentages,
South Dakota, 2002
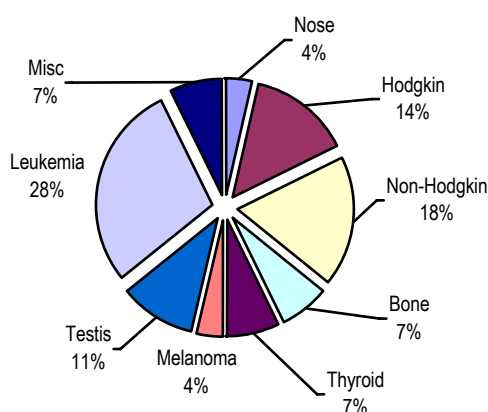
Source: South Dakota Department of Health

Descriptive Epidemiology

The types and distribution of childhood cancers differ notably from those occurring in adult populations. The International Association of Cancer Registries (IACR) has established a unique system for categorizing childhood cancers and this report follows that system. Whereas adult cancers are usually organized by site of the primary tumor, childhood cancers are classified according to their histology (microscopic identification of cells and tissue). The histological classification for childhood cancers is useful for the purposes of understanding the origins of the cancer and for identifying the best treatment.

Incidence: Generally, 14 cases per 100,000 children are expected nationally. In 2002, 30 cancers were reported to the SDCR for South Dakotans, ages 0-19. Of these 28 were white and 2 were American Indians. Cancers were reported 3 times as much as females but the rates were twice that of the female rate. Trends in incidence for the United States show increases for all sexes and races. The SDCR cannot currently present incidence trend data. Leukemias accounted for 8 of the childhood cancers with 4 below age 5, 1 at the 5-9 age group and 3 in the 15-19 age-group. Lymphoma accounted for 9 childhood cancers, 4 Hodgkin and 5 non-Hodgkin lymphomas, all of which occurred among children ages 6-19 years.

Mortality: In 2002, 4 white children, 1 American Indian and 1 other race died from childhood cancers in South Dakota. South Dakota's mortality rates are no different from the national rate. Counts were too low to look at trends at a state level. However, national trends for the decade 1998-2002 show decreasing trends in death rates for children less than 19 years old with 6.5 change (PC) for all races, - 4.8 for whites and an increasing trend of 3.5 for American Indians. The annual percent change (APC) for all races were decreasing trends of -1.9 total, -1.4 for whites and an increasing APC of 0.7 for American Indians.

The mortality/incidence ratio was 0.2 for all races in 2002.

Risk and Associated Risk Factors

Children who have been treated for one primary cancer are at increased risk of a second primary cancer later in life, i.e. a second primary cancer which is unrelated to the first cancer and not a result of the first cancer spreading or returning. Radiation and chemotherapies may increase the risk of subsequent primary cancers. Close monitoring of children for additional cancers is recommended after initial treatment for cancer. Each primary malignancy is counted as a separate cancer when calculating incidence rates, thus the total number of cancers can be greater than the total number of affected children. The increased risk of a second primary cancer persists into adulthood. Bone cancers appear during teenage years. Typically, the factors that trigger

cancer in children are usually not the same factors that may cause cancer in adults, such as smoking or exposure to environmental toxins. Rarely, there may be an increased risk of childhood cancer in children who have a genetic condition, such as Down syndrome. In almost all cases, however, childhood cancers arise from non-inherited mutations (or changes) in the genes of growing cells. Because these errors occur randomly and unpredictably, there is currently no effective way to prevent them.

There is limited evidence that magnetic fields cause childhood leukemia, and there is inadequate evidence that these magnetic fields cause other cancers in children. Studies show no general increased risk for those living close to nuclear power plants.

Early Detection and Prevention

Sometimes, a child's doctor may be able to spot early symptoms of childhood cancer at regular checkups. However, some of these symptoms (such as fever, swollen glands, frequent infections, anemia, or bruises) are also associated with other infections or conditions that are not cancer. Because of this, it is not uncommon for both doctors and parents to suspect other childhood illnesses when cancer symptoms first appear.

Table 20: Childhood cancer cases by sites, South Dakota, 2002

	Total	Male	Female
Brain & central nervous sys.	2	2	0
Nose, nasal cavity	1	1	0
Hodgkin lymphoma	4	3	1
Non-Hodgkin lymphoma	5	3	2
Bone & joint	2	2	0
Thyroid	2	0	2
Melanomas of the skin	1	0	1
Testis	3	3	0
Leukemias	8	7	1
Miscellaneous	2	1	1
Total Cases	30	22	8

Source: South Dakota Department of Health

Table 21: Childhood cancer deaths by site, South Dakota, 2002

	Total	Male	Female
Kidney & renal pelvis	1	0	1
Brain & central nervous sys.	3	2	1
Adrenal gland	1	0	1
Leukemia	1	1	0
Total Deaths	6	3	3

Source: South Dakota Department of Health

Table 22: Childhood cancer age-adjusted death rates by race, South Dakota and United States, 2002 and 1998-2002

	2002			1998-2002		
	Total	White	American Indian	Total	White	American Indian
South Dakota +	2.5	2.8	2.6	3.1	3.0	1.8
United States *	2.8	3.0	2.2	2.8	2.8	1.8

Note: Rates are per 100,000 persons, age –adjusted to the U.S. 2000 standard population
Source: + South Dakota Department of Health; * SEER Cancer Statistic Review 1975-2002

COLORECTAL
South Dakota 2002

Incidence and Mortality Summary

|	Total	Males	Females
Number of invasive cases	509	266	243
Number of *in situ* cases	36	23	13
South Dakota incidence rate+	61.9▲	74.2▲	51.3▲
United States incidence rate*	50.5	58.5	44.2
Number of deaths	170	79	91
South Dakota death rate+	19.0	21.7	16.9
United States death rate*	19.6	23.8	16.5
Healthy People 2010 Obj.	**13.9**		

Rates are per 100,000 persons, age-adjusted to the 2000 U.S. standard population
▲ significantly higher rates than the U.S. rates
+ Source: South Dakota Department of Health
SEER Cancer Statistics Review 1975-2002

Colorectal cancer stage at diagnosis
South Dakota, 2001
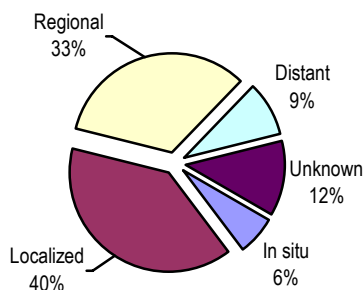
Source: South Dakota Department of Health

Descriptive Epidemiology

Incidence: Colorectal cancer was the third leading cancer reported and accounted for 13 percent of new cases in 2002 with 509 invasive cases. The age-adjusted incidence rate was statistically significant when compared to the national rate. There were 474 cases among whites with a significantly high age-adjusted incidence rate of 60.1 compared to the national rate. There were 19 cases among American Indians with rate of 59.8 per 100,000 persons. Slightly more males than females were diagnosed with colorectal cancer. It was the third leading cancer reported for males and second for females. Ninety two percent of cases occurred after age 50.

Stage at diagnosis: Approximately 46% were diagnosed at in situ and localized stages and 42 %

were diagnosed at the later stages, regional and distant. Fifty-four percent of both white and American Indian cases reported were at the later regional and distant stages.

Mortality: Colorectal cancer was the third leading cause of death with 13 percent of deaths due to cancer in 2001. Colorectal cancer deaths are decreasing in South Dakota with the 1998-2002 five-year trend in death rates of -22.6 percent change (PC) with an -5.8 annual percent change (APC). Whites had a -20.1 PC with a
-5.8 APC while American Indians had an increase, 2.6 PC with APC 6.5.

The mortality/incidence ratio was 0.3 for all races, 0.4 for whites and 0.8 for American Indians

Risk and Associated Factors

Risk factors include family or personal history, a history of irritable bowel disease or breast or reproductive cancers. Smoking, lack of physical activity, obesity and diets high in red meat and alcohol and low vegetable consumption contribute to increased risk. Aspirin use, calcium intake and hormone replacement therapy may reduce risk.

Early Detection and Prevention

Some studies have shown that the use of non-steroidal, anti-inflammatory drugs (NSAIDs) may be associated with a reduced risk of colorectal cancer and that the removal of polyps in the colon may also be associated with a reduced risk. Postmenopausal female hormone use is associated with a reduced risk of colon cancer but not rectal cancer. Colorectal cancer screening is recommended for all persons over 50 years, or earlier for persons at risk. Detecting cancers early leads to reducing mortality. Persons at high risk should talk with their physician for advice for earlier screening prior to age 50

**Figure 30: Colorectal cancer cases and deaths by age
South Dakota 2002**
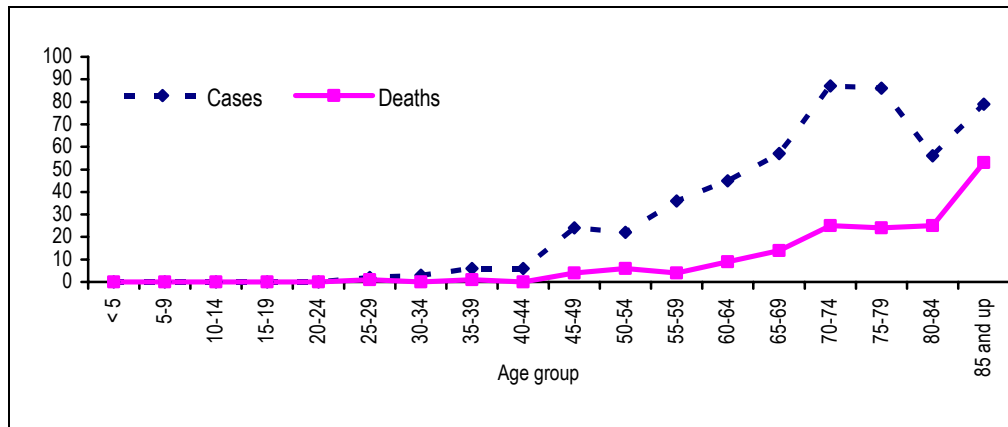
Source: South Dakota Department of Health

 Cases peaked at the 70-74 age-group with a lower peak among younger persons at 45-49 age-group. There was a slight peak for deaths at ages 50-54, followed by a rise as people aged. Incidence rates followed a similar pattern as the cases and the death rates increased with age.

Figure 31: Colorectal age-specific cancer incidence and death rates
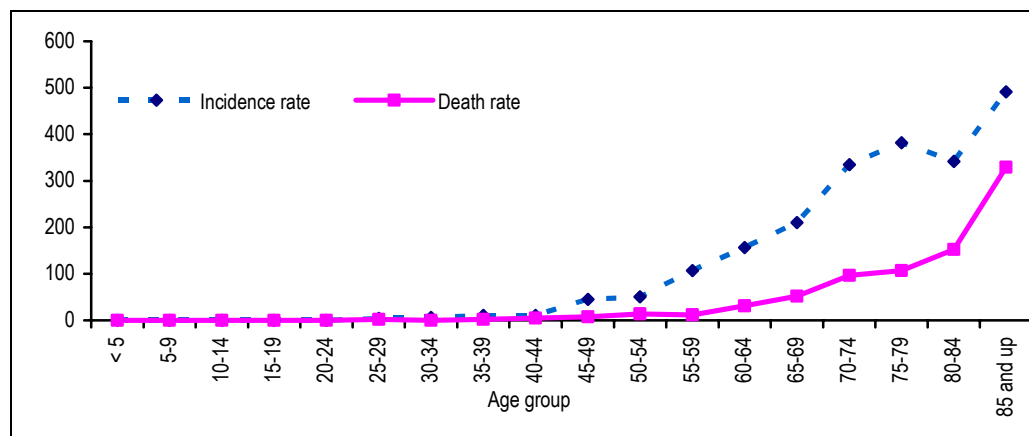
South Dakota 2002

Notes: Rates are per 100,000 persons
Source: South Dakota Department of Health

**Table 23: Colorectal, age-adjusted death rates,
South Dakota and United States, 2002 and 1998-2002**

	2002			1998-2002		
	Total	White	American Indian	Total	White	American Indian
South Dakota +	19.0	19.0	§	22.2▲	22.1▲	21.3▲
United States *	19.6	19.1	11.1	20.5	20.3	13.9

Note: Rates are per 100,000 persons, age-adjusted to the 2000 U.S. standard population.

§ No. of deaths too low to calculate a meaningful rate.

▲ Statistical significance higher than the U.S rates.

Source: + South Dakota Department of Health   * SEER Cancer Statistics Review 1975-2002

CORPUS AND UTERUS, NOS
South Dakota, 2002

Incidence and Mortality Summary

|	Females
Number of invasive cases	146
Number of *in situ* cases	2
South Dakota incidence rate+	34.6▲
United States incidence rate*	23.6
Number of deaths	19
South Dakota death rate+	3.6
United States death rate*	4.2

Rates are per 100,000 women, age-adjusted to the 2000 U.S. standard population
▲ Significantly higher than the U.S. rate
+ Source: South Dakota Department of Health
* *SEER Cancer Statistics Review 1975-2001*

Corpus and uterus, NOS stage at diagnosis
South Dakota, 2002
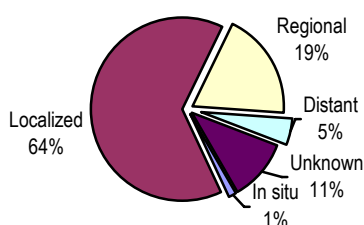
Source: South Dakota Department of Health

Descriptive Epidemiology

Incidence: Cancer of the uterus, sometimes referred to as endometrial cancer, is the most common gynecologic cancer in South Dakota. It accounted for 3.6 percent cases of cancer cases reported. Of the 146 cases reported, only 7 were identified as American Indian, resulting in an age-adjusted incidence rate of 34.7, no different from the South Dakota total 35.8 or the white rate 33.7. More than half the cases occurred in women over 40.

Stage at diagnosis: Most cases in South Dakota were diagnosed at the localized stage.

Mortality: There were 18 deaths attributed to endometrial cancer in 2002, almost 50% less than during 2001. Of the 18 women who died from this cancer in 2002, 17 were white with an age-adjusted

rate of 2.4 and 1 was American Indian with a similar rate 2.5 per 100,000 women. The 2002 and 1998-2002 death rates for American Indians were statistically significant when compared to the United States rates. Trends in the death rate showed an increase over the five-year period 1998 -2002 with a 28 percent change (PC) and APC of 14.4%. Whites showed a decrease of PC -11.2 PC with 9.8% APC Counts were too low to calculate an APC for American Indian women.

The mortality/incidence ratio was .13 for all women.

Risk and Associated Factors

Chronic exposure to estrogen over a lifetime increases risk. Factors such as tamoxifen therapy for breast cancer, diabetes mellitus and hypertension, few or no children, genetic predisposition, and previous cancer of the breast, colon or ovary, are associated with increased risks.

Note: The risk of developing uterine cancer is actually higher than the rates reported because the denominator used to calculate the rates are all women. Only women with a uterus can develop uterine cancer and since the number of women without a uterus is unknown, the denominator is higher than it should be, resulting in a lower rate.

Early Detection and Prevention

There is no equivalent screening test for endometrial cancer as the Pap smear and its essential role in screening for cervical cancer. Possible signs of endometrial cancer include unusual vaginal discharge or pain in the pelvis. A woman should see her doctor if there are symptoms of bleeding or discharge not related to menstruation, difficult or painful urination, pain during sexual intercourse and pain in the pelvic area. .

To diagnose endometrial cancer, a sample of endometrial tissue must be removed using endometrial biopsy or by dilatation and curettage.

**Figure 32: Corpus and uterus NOS cases and deaths by age,
South Dakota 2002**
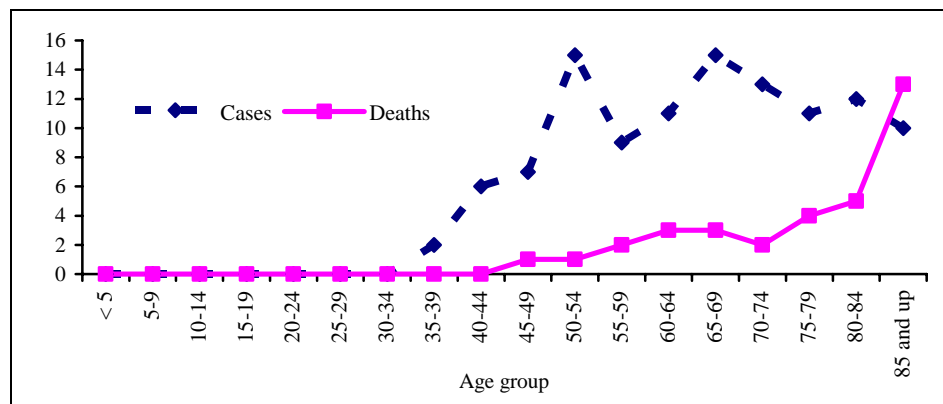
Source: South Dakota Department of Health

There were 2 incidence peaks at ages 50-54 and 65-69 and increasing number of deaths with age. Rates are more difficult to define because of the low numbers relative to incidence.

**Figure 33: Corpus and uterus NOS age-specific incidence and death rates
South Dakota, 2002**
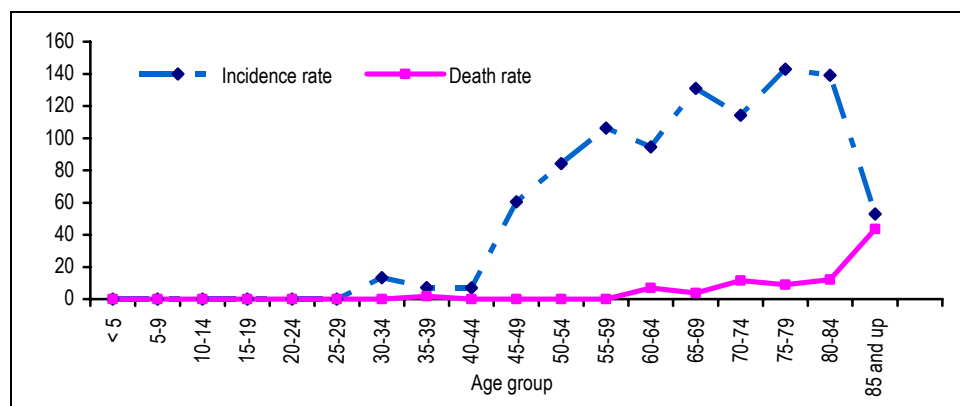
Rates are per 100,000 persons
Source: South Dakota Department of Health

**Table 24: Corpus and uterus NOS age-adjusted death rates by race,
South Dakota and United States, 2002 and 1998-2002**

	2002			1998-200		
	Total	White	American Indian	Total	White	American Indian
South Dakota +	3.6	3.4	3.5	3.9	3.7	8.3
United States *	4.2	3.9	3.2	4.1	4.1	2.5

Note: Rates are per 100,000 persons, age-adjusted to 2000 U.S. standard population.
Source: + South Dakota Department of Health   * *SEER Cancer Statistics Review 1975-2002*

KIDNEY AND RENAL PELVIS
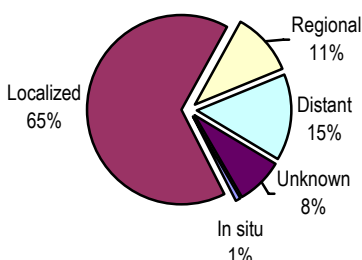**South Dakota, 2002**

Incidence and Mortality Summary

	Total	Males	Females
Number of invasive cases	109	70	39
Number of *in situ* cases	1	0	1
South Dakota incidence rate[+]	13.8	19.4	9.2
United States incidence rate*	11.8	16.6	8.0
Number of deaths	35	18	17
South Dakota death rate[+]	4.2	4.9	3.9
United States death rate*	4.2	4.2	4.3

Rates are per 100,000 persons, age-adjusted to the 2000 U.S. standard population
+ Source: South Dakota Department of Health
* *SEER Cancer Statistics Review 1975-2002*

Kidney and renal pelvis cancer
stage at diagnosis: South Dakota 2002

Source: South Dakota Department of Health

Descriptive Epidemiology

Incidence: Kidney and renal pelvic cancers were the ninth leading cancer reported to the SDCR in 2002 with 2.8% of observed cases. Men were affected 1.8 times as often as women. Most cases occur in older people except for Wilm's tumor (nephroblastoma), which affects mostly children under five and accounts for the majority of childhood kidney cancers. Of the 109 cases observed, 103 were white and six were American Indians. Renal cell carcinomas are 80 percent of adult kidney cancers.

Stage at Diagnosis: Almost two-thirds of all cases were diagnosed at the localized stage for all races.

Mortality*:* This cancer was the tenth leading cause of cancer death, accounting for 2.2% of all cancer deaths. Men and women died in approximately equal numbers from this cancer. South Dakota's 5-year, 1998-2002 percent change (PC) decreased -6.9 for all races with a 0.4 APC. Whites had – 5.3 PC with 0.6 APC. Counts for American Indians were too low to analyze. There were no significant differences among rates for whites and American Indians when compared with each other and with the national rate in 2002 and for 1998-2002.

The mortality/incidence ratio was .3 for all races.

Risk and Associated Factors

Tobacco use is strongly associated with adult kidney cancer. Obesity is positively associated as well as occupational exposure to aniline dyes, benzene or 2-napthalene. Approximately one percent of cases cluster in families.

Early Detection and Prevention

Since it is difficult to diagnose renal cancer until it becomes symptomatic many cases are diagnosed at later stages when treatment is more difficult. Symptoms include sporadic blood in the urine and sometimes pain at the point where approximately one-third would have already metastasized. The only preventive measure is for adults to quit smoking.

**Figure 34: Kidney and renal pelvis cases and deaths by age,
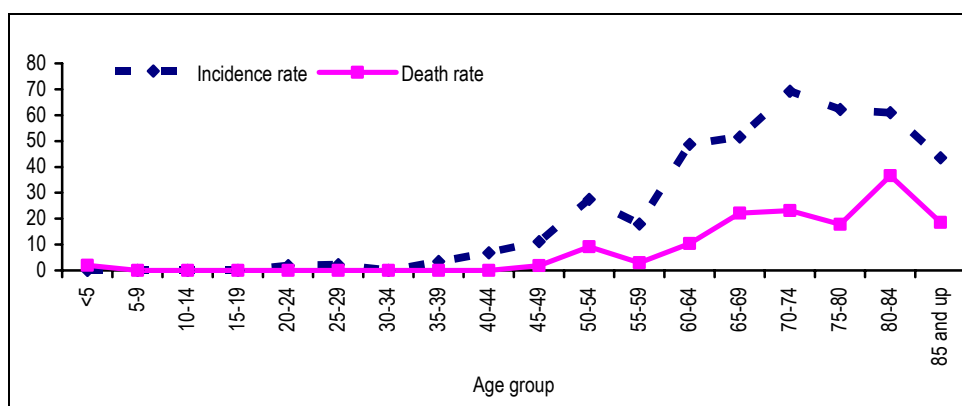South Dakota 2002**
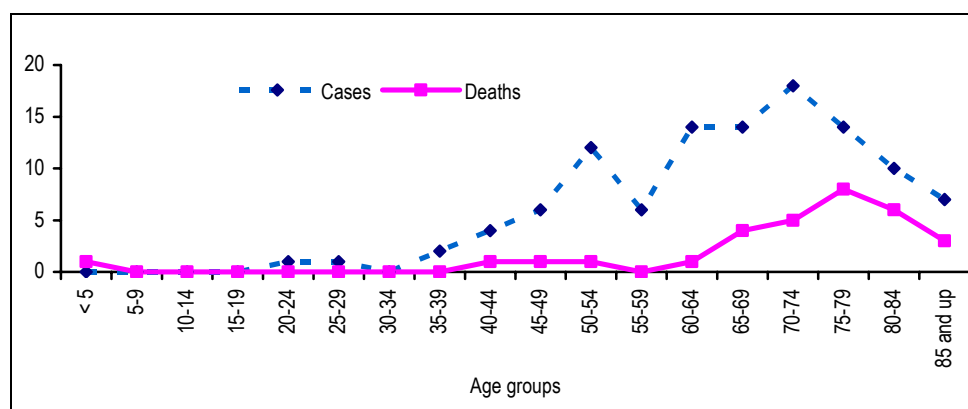
Source: South Dakota Department of Health

Incidence peaks were at the young age group 50-54 and alter at 70-74 years with rates peaking at the same age-groups. Deaths peaked at 75-79 with death rates peaking at age 80-84 year old.

**Figure 35: Kidney and renal pelvis age-specific incidence and death rates,
South Dakota 2002**

Rates are per 100,000 persons
Source: South Dakota Department of Health

**Table 25: Kidney and renal pelvis age-adjusted death rates by race
South Dakota and United States, 2002 and 1998-2002**

	2002			1998-2002		
	Total	White	American Indian	Total	White	American Indian
South Dakota +	4.2	4.1	3.9	4.3	6.4	6.0
United States *	4.2	4.3	5.5	4.2	4.3	5.1

Note: Rates are per 100,000 persons, age-adjusted to the 2000 U.S. standard population
Source: + South Dakota Department of Health; * *SEER Cancer Statistics Review 1975-2002*

LEUKEMIA
South Dakota, 2002

Incidence and Mortality Summary

	Total	Males	Females
Number of cases	89	54	35
South Dakota incidence+	11.4	15.0	8.2
United States incidence*	11.4	14.9	8.8
Number of deaths	66	40	26
South Dakota mortality+	7.7	10.9	5.3
United States mortality*	7.5	10.1	5.7

Rates are per 100,000 persons, age adjusted to the 2000 U.S. standard population
+ Source: South Dakota Department of Health
*SEER Cancer Statistics Review 1975-2002

Leukemia stage at diagnosis
South Dakota, 2002

Leukemias are not staged because they involve bone marrow throughout the body and often have spread to other organs. Doctors classify them by type and subtype in an attempt to determine the prognosis and a recommended level of treatment.
Chronic myelogenous leukemia is grouped by phases and chronic lymphocytic leukemia (CLL) uses a Rai classification

Descriptive Epidemiology

Incidence: Leukemias are a diverse group of cancers and are sub-typed by histology. Subtypes have different etiology, treatment and prognosis. Leukemias accounted for 2.3 percent of all cases reported to the SDCR. The most common types reported were chronic lymphocytic and acute myeloid leukemias.

The age adjusted incidence rate, 11.5 is 3.3 times that of the American Indian rate of 3.4 cases per 100,000 persons.

Leukemia is a common childhood cancer with 8 cases reported in 2002 in children less than 19 years old. Children under 19 have a higher incidence than those ages 20-34 years and incidence increases with age over 35 years old. The most cases reported were among adults 80-84 years old.

Mortality: Leukemia accounted for 3.5% of cancer deaths with acute myeloid leukemia being the most frequent cause of leukemia deaths. Whites had twice the death rate of American Indians for leukemias in South Dakota. Trends in death rates for leukemia for 1998-2002 showed a decrease with -11.9 PC and -3.5 APC. For whites, the PC was -13.4 with a -4.2 APC. Deaths for American Indians were too low for meaningful data.

The mortality/incidence ratios were the same 0.74 for all persons, males and females.

Risks and Associated Risk Factors

Causes for most of these cancers are unknown. Occupational exposures to benzene and radiation, certain chromosomal abnormalities, such as Down syndrome, human T-cell lymphocytic virus type I (HTLV-I) and cigarette smoking may be associated with leukemias. Childhood leukemias in the early years may be related to genetic factors and certain prenatal and post-natal exposures.

Early Detection and Prevention

There are no early detection or prevention strategies. Often symptoms are the same as for many other health problems, thus early detection is difficult. Diagnosis is made using blood tests and bone marrow biopsies.

Figure 36: Leukemia cases and deaths by age,
South Dakota 2002
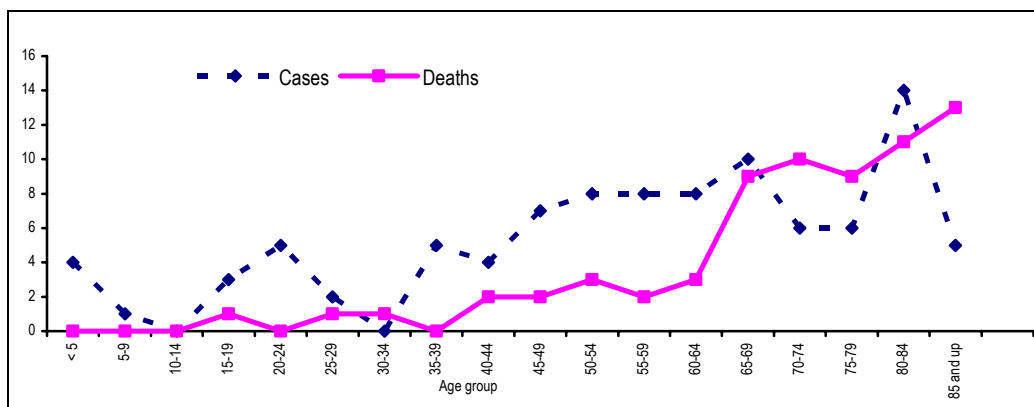
Source: South Dakota Department of Health
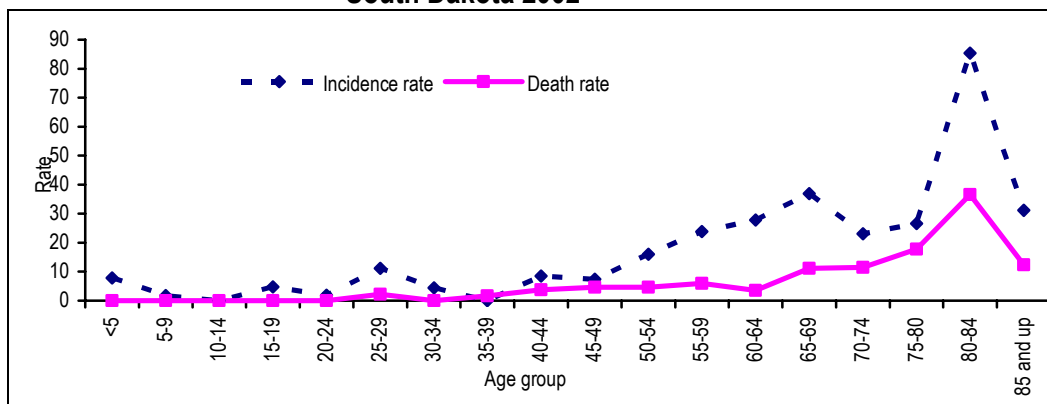
Leukemia has peaks at both younger years and among aging populations for incidence and deaths with a similar pattern or both incidence and death rates.

Figure 37: Leukemia age-specific incidence and death rates,
South Dakota 2002

Rates are per 100,000 persons
Source: South Dakota Department of Health

Table 26: Leukemia age-adjusted death rates,
South Dakota and United States, 2002 and 1998-2002

	1998			1998-2002		
	Total	White	American Indian	Total	White	American Indian
South Dakota	7.7	7.7	3.8	8.2	8.3	§
United States	7.5	7.7	3.9	7.6	7.8	3.9

Note: Rates are age adjusted per 100,000 persons to 2000 U.S standard population
§ Counts are too low to give stable rates
Source: + South Dakota Department of Health
SEER Cancer Statistics Review 1975-2002

Cancer in South Dakota 2002

LUNG AND BRONCHUS
South Dakota, 2002
Incidence and Mortality Summary

|	Total	Males	Females
Number of cases	444	270	174
Number of *in situ* cases	0	0	0
South Dakota incidence rate⁺	55.0	74.9	39.3
United States incidence rate*	58.4	73.3	47.0
Number of deaths	399	234	165
South Dakota death rate⁺	47.6▼	63.6▼	36.8
United States death rate*	54.9	73.5	41.5
Health People 2010 Obj.	**44.9**		

Rates are per 100,000 persons age adjusted to the 2000 U.S. std. pop.
  Source: + South Dakota Department of Health
           SEER Cancer Statistics Review 1975-2002

Lung and bronchus stage at diagnosis
South Dakota 2002
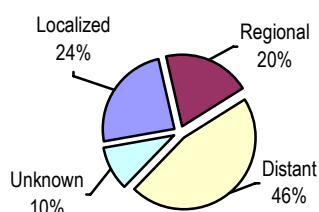
Source: South Dakota Department of Health

Descriptive Epidemiology

Lung and bronchus cancer is one of the few cancers with high death rates because it is usually diagnosed at late stages when symptoms appear.

Incidence: Lung and bronchus cancer cases were the fourth leading cancer reported during 2002 at 11.5% of cases reported. By race, 419 whites and 22 American Indians were diagnosed with invasive lung and bronchus cancer. The age-adjusted incidence rate among American Indians, 85.7, was 58% percent higher than the white rate of 54.2 cases per 100,000 persons. Lung cancer incidence rates increased with age. More males than females were diagnosed.
Stage at diagnosis*:* In South Dakota 46% of all cases, 45% of white cases and 45% of American Indian cases were diagnosed at distant stages.

Mortality: There were 383 deaths among whites and 19 among American Indians. The total and white

rates for 2002 and 1998-2002 were significantly lower when compared to the United States rates.
However, American Indians had higher rates than the national rates for the same period. Males died at a rate of 1.76 to females and deaths peaked at the 75-79 age group.

For the five-year period 1998-2002, the trend for lung and bronchus death rates for South Dakota showed increases of 2.0 percent change (PC)   with 0.4 APC. There was a 3.2 % PC for whites and a 0.8 APC. However, there was a decrease for American Indians a -9.5 PC and a -6.2 APC.

The mortality/incidence ratio in 2002 in South Dakota was 0.89 for all races, 0.85 for males and 0.95 for females. By race it was .94 for whites and .86 for American Indians.

Risk and Associated Factors

Cigarette smoking, including exposure to second hand smoke, is the most important risk factor accounting for 68 to 78 percent of lung cancer deaths among females and 88 to 91 percent among males. Occupational or environmental exposures such as radon, asbestos, coal tars, crystalline silica and polycyclic aromatic hydrocarbons increase risk. One to two percent of lung cancer deaths are attributable to air pollution.

## Early Detection and Prevention

There are no recommendations for screening. Early detection of lung cancer is difficult because symptoms usually do not appear until the disease is advanced. The best prevention is to quit smoking. Smoking is responsible for 66 percent of lung cancers. Treatment options may involve a combination of surgery, radiation and chemotherapy because of late stage diagnoses.

Figure 38: Lung and bronchus cases and deaths by age, South Dakota 2002
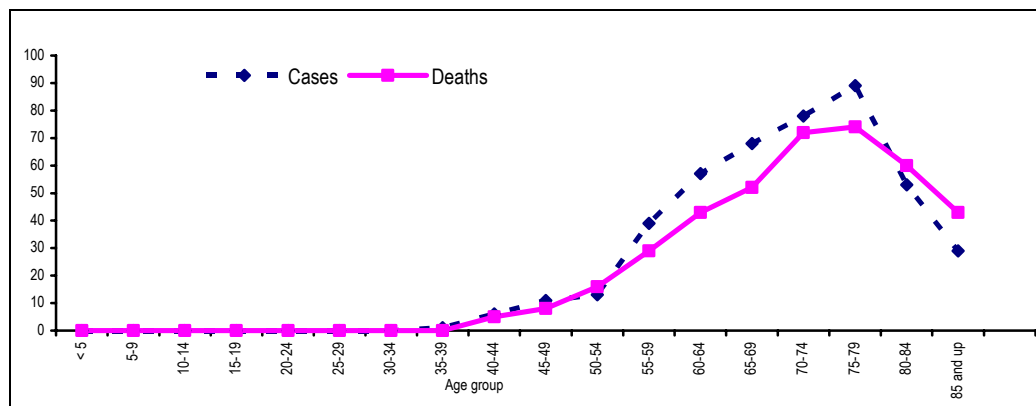
Source: South Dakota Department of Health

Cases and deaths peaked at the 75-79 age group with incidence rates peaking at the same age and death rates peaking at 80-84 age-group.

Figure 39: Lung and bronchus age-specific incidence and death rates, South Dakota 2002
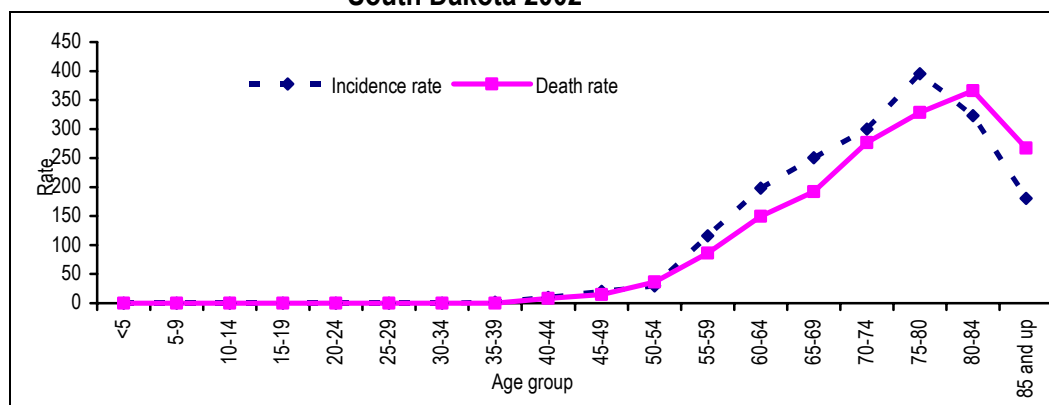
Rates are per 100,000 persons
Source: South Dakota Department of Health

Table 27: Lung and bronchus age-adjusted death rates by race, South Dakota and United States, 2002 and 1998-2002

	2002			1998-2002		
	Total	White	American Indian	Total	White	American Indian
South Dakota +	47.6▼	47.2▼	70.7▲	48.1▼	47.1▼	79.6▲
United States *	54.9	55.2	33.7	55.7	55.1	35.4

Note: Rates are per 100,000 persons, age-adjusted to the 2000 U.S. standard population.
▼ Statistical significance lower than the national rate   ▲ Statistical significance higher than the national rate
Source: + South Dakota Department of Health;   * SEER Cancer Statistics Review 1975-2002

Cancer in South Dakota 2002

MELANOMA (SKIN)
South Dakota, 2002

Incidence and Mortality Summary

	Total	Males	Females
Number of invasive cases	123	69	54
Number of *in situ* cases	49	31	18
South Dakota incidence rate+	15.7	19.5	13.4
United States incidence rate*	17.0	21.5	13.9
Number of deaths	16	11	5
South Dakota death rate+	1.9	2.9	1.1
United States death rate*	2.6	3.8	1.7
Healthy People 2010 Obj.	**2.5**		

Rates are per 100,000 persons age adjusted to the 2000 U.S. standard
+ Source: South Dakota Department of Health
SEER Cancer Statistics Review 1975-2001

Melanoma stage at diagnosis
South Dakota 2002
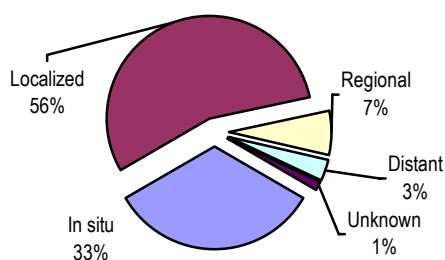
Source: South Dakota Department of Health

Descriptive Epidemiology

Incidence: Invasive melanoma of the skin accounted for 3.2 % of the cancers reported to the SDCR. Reporting fell short of the 200 cases for 2002, therefore the incidence rate should be used with caution. Melanoma incidence increases with age and is generally higher among men than women. Melanoma is primarily a cancer of white populations and ethnic background is determinant among this population.

Stage at diagnosis: Eighty-nine percent were diagnosed at early in situ and localized stages.

Mortality: Deaths were one percent of cancer deaths. The five-year trend in mortality rates from 1998-2002 a percent change (P.C) of – 39.3% and an annual percent change (APC) of -6.5%.

Risk and Associated Factors

Fair skin or complexion, history of sunburns and/or exposure to ultraviolet light (both sun and artificial UV light), and multiple dark moles are the highest risk factors. A history of three or more sunburns, particularly blistering sunburns, from either sun exposure or tanning booths before age 20 greatly increases risk. Individuals with a prior history or family history of melanoma are also at risk. Immuno-suppressed persons also have increased risk.

Early Detection and Prevention

Skin cancers are the most common cancers diagnosed. Fortunately most are non-life threatening basal and squamous cell cancers. The less common melanomas, if not caught early can lead to death. The best way to identify early melanoma is through the recognition of changes in skin growth such as moles or appearance of new growths. Skin examinations should be part of regular checkups and people at risk should be using the ABCDE and P rule with monthly self-examinations.

11H**A**symmetry: One part of the mole gets suddenly larger on one side to make it appear asymmetrical (lopsided).
Border: The edge or border of the mole suddenly changes from a round or smooth curved line to a line with an irregular, notched or angular character.
Color: The color of the mole is no longer one color but develops two or more multiple colors of brown, tan, pink, red, white and even black.
Diameter: The width of the mole or size suddenly increases in diameter and is much larger than before over a short period of only a few months (two or more).
Elevated: A mole which was previously flat suddenly develops a pigmented (usually dark brown or black) nodule (a firm round small lump) which is elevated above the surface of the old mole.
Persistent: A mole develops any one or more of the following: (a) persistent itching, (b) persistent scaling and inflammation (redness) of its surface, (c) persistent bleeding or ulceration and/or (d) persistent changes as seen in the ABCDE rule.

Figure 40: Melanoma cases and deaths by age, South Dakota 2002

Source: South Dakota Department of Health

Notable is the incidence of melanoma at younger ages but here are no clear patterns for deaths. The decrease in deaths as reflected in trends for death rates is an indication of early detection and treatment.

**Figure 41: Melanoma age-specific incidence and mortality rates
South Dakota 2002**
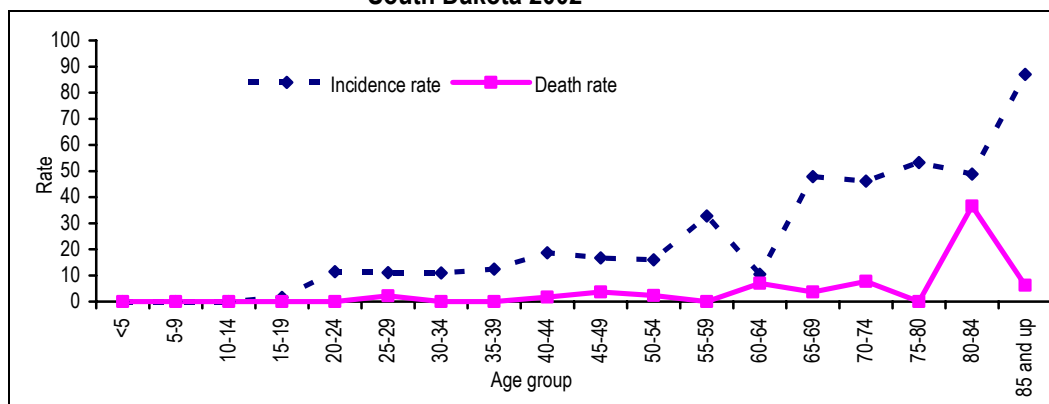
Rates are per 100,000 persons
Source: South Dakota Department of Health

**Table 28: Melanoma age-adjusted death rates
South Dakota and United States 2002 and 1998-2002**

	2002			1998-2002		
	Total	White	American Indian	Total	White	American Indian
South Dakota	1.9	2.0	0.0	2.5	2.6	0
United States	2.6	2.9	1.1	2.7	3.0	0.7

Note: Rates are age adjusted per 100,000 persons to 2000 U.S standard population
Source: + South Dakota Department of Health; *SEER Cancer Statistics Review 1975-2002*

Cancer in South Dakota 2002

MYELOMA♫
South Dakota, 2002

Incidence and Mortality Summary

|	Total	Males	Females
Number of invasive cases	40	18	22
Number of *in situ* cases	0	0	0
South Dakota incidence rate+	5.0	5.0	4.9
United States incidence rate*	5.4	7.0	4.2
Number of deaths	40	14	17
South Dakota death rate+	4.7	5.2	4.1
United States death rate*	3.8	4.8	3.1

♫ includes NOS, multiple, plasma cell and solitary
Rates are per 100,000 persons, age-adjusted to the 2000 U.S. standard
+ Source: South Dakota Department of Health
* *SEER Cancer Statistics Review 1975-2002*

Myeloma stage at diagnosis
South Dakota 2002
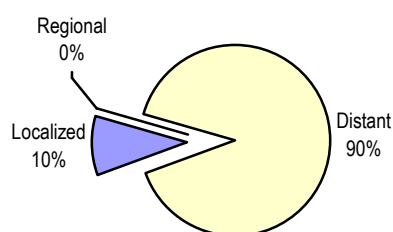
Source: South Dakota Department of Health

Descriptive Epidemiology

Myeloma is a malignancy of plasma cells and can proliferate throughout the body. Plasma cell disorders are somewhat uncommon. The median age at diagnosis is 67 years of age, and it rarely occurs in people under age 45. Eighty percent of cases occur after age 60.

Incidence: Myeloma accounts for approximately 1% of cancers in both South Dakota and the United States. It is rare in persons under 50 years old with a median age at diagnosis of 67 years. The incidence rate is higher among males than females. In South Dakota, whites are afflicted more than minorities with 36 cases among whites and 2 among American Indians.

Stage at diagnosis: Most of the cases reported were at distant stage as this disease diffuses throughout the body.
Mortality: Myeloma accounted for 2.5% of cancer deaths. There was no difference between the male

and female death rates. Whites accounted for 38 of the 40 deaths and American Indians had 2 deaths. Trends in death rates for 1998-2002 showed a percent change of 12.9 % with annual percent change (APC) of 3.7% for all South Dakotans. These increases reflect deaths among white South Dakotans. Counts are too low to be reported for American Indians.

The mortality/incidence ratio in 2002 was 1.

Risk and Associated Factors

The etiology of this cancer is relatively unknown. There is little evidence of the role of exposure to toxic substances, and ionizing radiation. Some viruses are thought to be associated with myeloma. There could also be a possible familial role and auto-immune conditions and chronic immune stimulation may increase risk.

Early Detection and Prevention

There is no known test for early detection. It is very difficult to diagnose. Myeloma (about 90%) involving multiple marrow sites is by far the most common way in which the disease appears. There are also solitary myeloma (only one site evident), localized myeloma (a few neighboring sites evident) or extramedullary myeloma (involvement of tissues other than the marrow, such as skin, muscle or lung). Tumors of plasma cells outside the marrow are referred to as *plasmacytomas*. Some cases of myeloma progress very slowly, and they may be referred to as smoldering or indolent myeloma. The presence of plasma cells and proteinuria do not automatically lead to myeloma. It is often asymptomatic in its early stages. Diagnosis involves the presence of M protein, *monoclonal immunoglobulin* in serum and urine, and 30 percent plasma cells in the bone marrow. Estimating tumor burden is critical in staging and determining if myeloma is present. Myeloma is often diagnosed by clinically.

Figure 42: Myeloma cases and deaths by age, South Dakota 2002
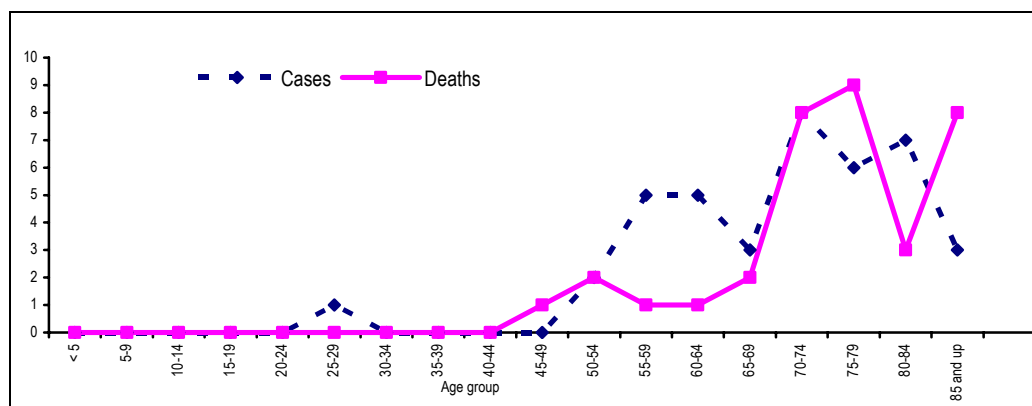
Source: South Dakota Department of Health

Both cases and deaths increase with age with rates reflecting similar patterns.

**Figure 43: Myeloma age-specific incidence and death rates by age groups
South Dakota 2002**
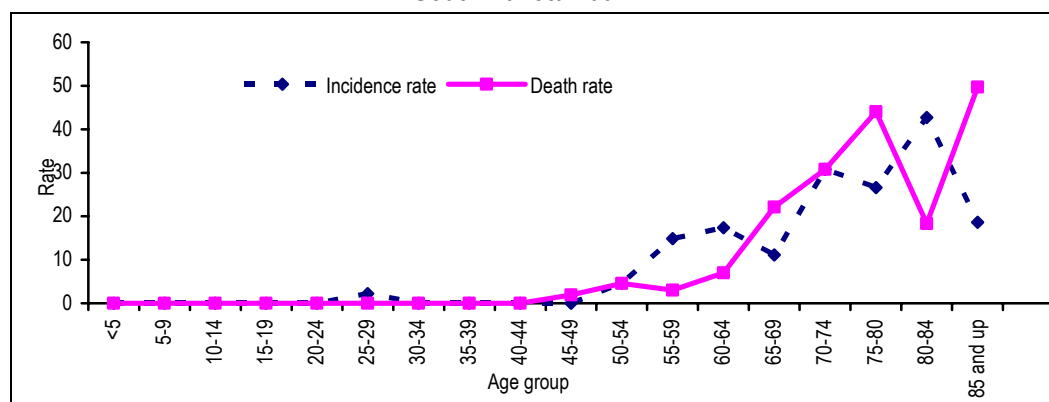
Rates are per 100,000 persons
Source: South Dakota Department of Health

**Table 29: Myeloma age-adjusted death rates,
South Dakota and United States, 2002 and 1998-2002**

	2002			1998-2002		
	Total	White	American Indian	Total	White	American Indian
South Dakota	4.7	4.6	§	4.1	4.1	§
United States	5.4	5.0	4.9	5.5	5.2	4.0

Note: Rates are age adjusted per 100,000 persons to 2000 U.S standard population

§ Count is too low to calculate stable rates.
Source: + South Dakota Department of Health
SEER Cancer Statistics Review 1975-2002

NON-HODGKIN LYMPHOMA
South Dakota, 2002

Incidence and Mortality Summary

	Total	Males	Females
Number of invasive cases	145	75	70
South Dakota incidence rate+	17.7	21.0	15.5
United States incidence rate*	18.9	22.9	15.8
Number of deaths	55	30	25
South Dakota death rate+	6.4	8.2	4.8
United States death rate*	7.6	9.6	6.2

Rates are per 100,000 persons age-adjusted to the 2000 U.S. standard
+ Source: South Dakota Department of Health
SEER Cancer Statistics Review 1975-2002

Non-Hodgkin lymphoma stage at diagnosis
South Dakota, 2002
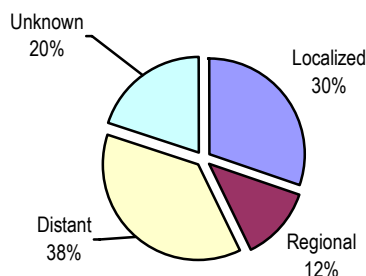
Source: South Dakota Department of Health

Descriptive Epidemiology

Lymphomas are malignancies of white blood cells and are typed either Hodgkin or the more common non-Hodgkin lymphoma (NHL). Lymphomas account for 56% of blood cancers. Non-Hodgkin lymphoma represents a diverse group of cancers, with the distinctions between types based on the characteristics of the cancerous cells. The groups are often classified as indolent or aggressive, low, intermediate and high grade. Non-Hodgkin lymphoma is a group of diseases and not just one type. Each histological grouping is diagnosed and treated differently, and each has prognostic factors that categorize it as more or less favorable.

Incidence: Lymphomas are malignancies of white blood cells and are typed either Hodgkin or the more common non-Hodgkin lymphoma (NHL). Eighty

seven percent of the lymphomas reported to the SDCR in 2002 were NHL. It was the sixth leading cancer reported to the SDCR with three percent of new cases. There is a steep rise in cases as the population ages. The American Cancer Society estimated 200 new cases of NHL for South Dakota in 2002, therefore NHL might be under reported and the incidence data should be used with caution.

Stage at Diagnosis: Many NHL spread to extranodal sites and are diagnosed at distant stage. The SDCR will try to reduce the 20% diagnosed at unknown stage.

Mortality: NHL was the sixth leading cause of death by cancer with 3.5% of cancer deaths. Of the 55 deaths which occurred in 2002 in South Dakota, 54 were among whites and 1 was American Indian. The five-year trends in death rates from 1998-2002 showed a decline with a percent change (PC) of -33.3 and an annual percent change (APC) of -7.1 for all South Dakotans with a similar trend for whites. American Indian trends are based on counts too low to be considered stable.

Risk and Associated Factors

There are no known risk factors. Immuno-suppressants increase the risk of NHL. HIV and other viruses, exposures to ethylene oxide and other chemicals in solvents, and pesticides or fertilizers are associated risk factors.

Early Detection/Prevention

There are no established tests to detect NHL early on a wide scale. It is usually diagnosed after patients present with signs and symptoms referable to lymphadenopathy. This is painless swelling of the lymph nodes, usually in the neck, armpit, and groin or in the abdomen. Other symptoms often include fever, night sweats, excessive tiredness, indigestion and abdominal pain, loss of appetite and bone pain. These symptoms also occur in infections, therefore, it is important to differentiate NHL from more common infections.

**Figure 44: Non-Hodgkin lymphoma cancer cases and deaths by age,
South Dakota 2002**
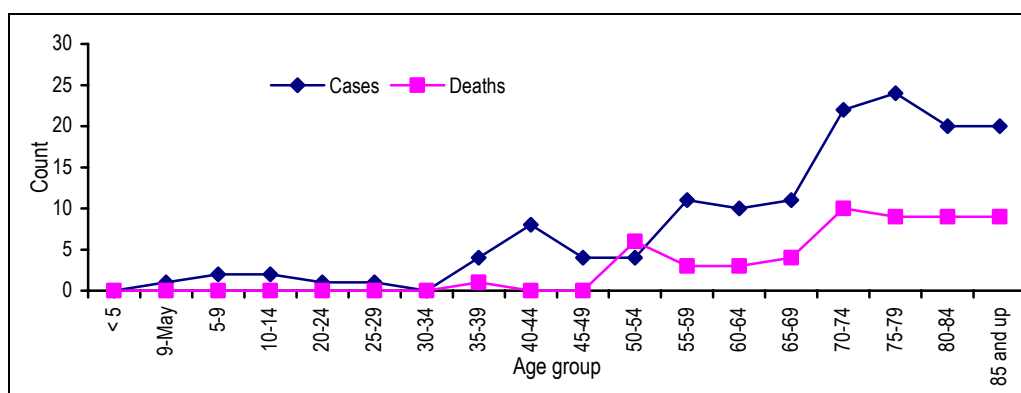
South Dakota Department of Health

There is a slight peak in cases at the age-group 40-44 followed by a peak in deaths at 50-54 years old. Rates had similar peaks at 40-44 for incidence and 50-54 for deaths.

**Figure 45: Non-Hodgkin lymphoma cancer age-specific incidence and death rates,
South Dakota 2002**
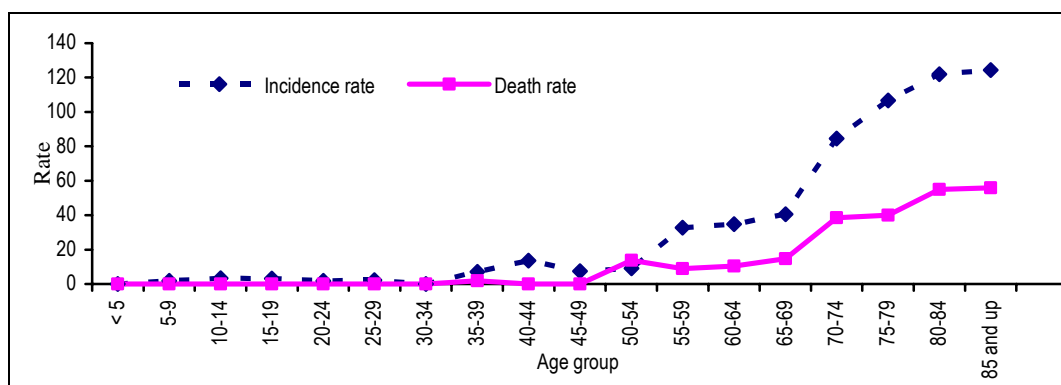
Rates are per 100,000 persons
Source: South Dakota Department of Health

**Table 30: Non-Hodgkin lymphoma age-adjusted death rates,
South Dakota and United States, 2002 and 1998-2002**

	2002			1998-2002		
	Total	White	American Indian	Total	White	American Indian
South Dakota +	6.4	6.5	1.9	9.3	9.4	4.2
United States *	7.6	7.9	2.9	8.1	8.5	4.5

Note: Rates are per 100,000 persons age adjusted to the 2000 U.S. standard population
Source: +South Dakota Department of Health; * *SEER Cancer Statistics Review 1975-2002*

ORAL CAVITY AND PHARYNX
South Dakota, 2002

Incidence and Mortality Summary

	Total	Males	Females
Number of invasive cases	89	63	26
Number of *in situ* cases	3	2	1
South Dakota incidence rate+	11.6	17.6	5.8
United States incidence rate*	10.3	15.3	6.3
Number of deaths	25	16	9
South Dakota death rate+	2.9	4.3	1.3
United States death rate*	2.7	4.1	1.5
Healthy People 2010 Obj.	**2.7**		

Rates are per 100,000 persons age adjusted to the 2000 U.S. standard
+ Source: South Dakota Department of Health
SEER Cancer Statistics Review 1975-2002

Oral cavity & pharynx stage at diagnosis
South Dakota 2002

Source: South Dakota Department of Health

Descriptive Epidemiology

Incidence: Oral and pharyngeal cancers comprise a variety of malignant tumors and are overwhelmingly squamous cell carcinomas. Oral cavity and pharynx cancers were the tenth most common cancer reported to the SDCR accounting for 2.3 percent of cancer cases reported. Age plays a definite role in this cancer as the peak age at diagnosis was 50 to 74 years. Males had higher incidence and mortality rates. Rates among American Indians were twice as high as those for whites in South Dakota and when compared to all races nationally.

Stage at diagnosis: Approximately half of the cases were diagnosed at localized stage.

Mortality: Oral-pharyngeal cancer was the sixteenth cause of cancer death at 1.3 percent. Death rates were not significant when compared to national rates. The PC for the period 1998-2002 showed an increase of 49.1% and an APC 6.7 for all races and similar to the trend for whites. The numbers of deaths for American Indians each year were too low to report trends.

The mortality/incidence ratio was 0.3 for 2002.

Risk and Associated Factors

Cigarette, cigar or pipe smoking and use of smokeless and spit tobacco along with excessive consumption of alcohol are major risk factors. Nearly 75 percent of cases are associated with tobacco use. Combined exposure with alcohol substantially increases risk and accounts for 90 percent of cases. Diets low in fruits and vegetables are also associated with risk and rates are higher among minorities and lower income groups.

Early Detection and Prevention

The single most effective measure to lower risk of developing this cancer is to reduce exposure to tobacco and alcohol. Most cases of oral cavity and pharynx cancers are preventable

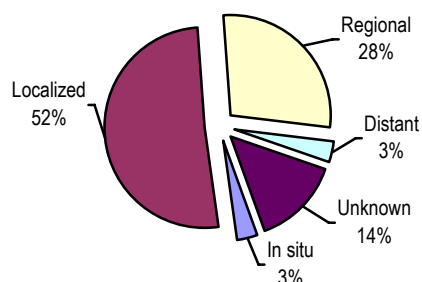**Figure 46: Oral cavity and pharynx cancer cases and deaths by age,
South Dakota 2002**
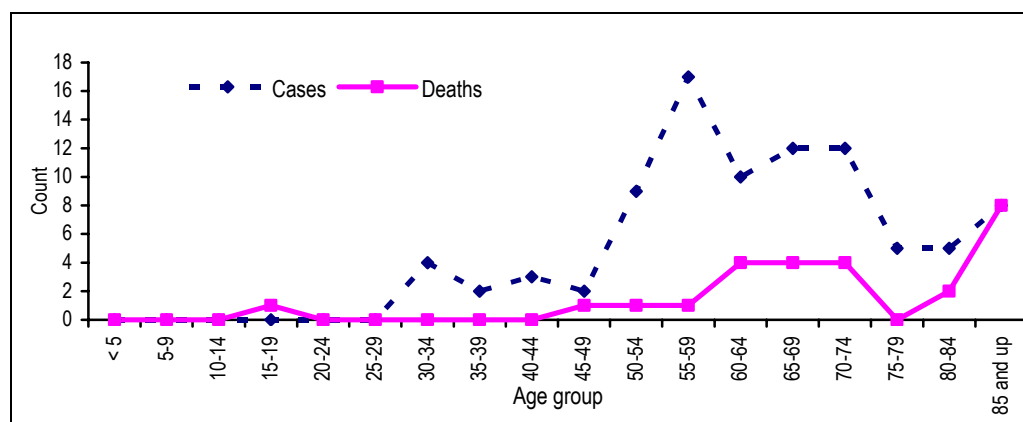
Source: South Dakota Department of Health

Cases peaked at 55-59 age-group and deaths peaked at 60 -74 before dropping, then rising   sharply.
Rates followed similar patterns both for incidence and deaths.

**Figure 47: Oral cavity and pharynx age-specific incidence and death rates,
South Dakota 2002**
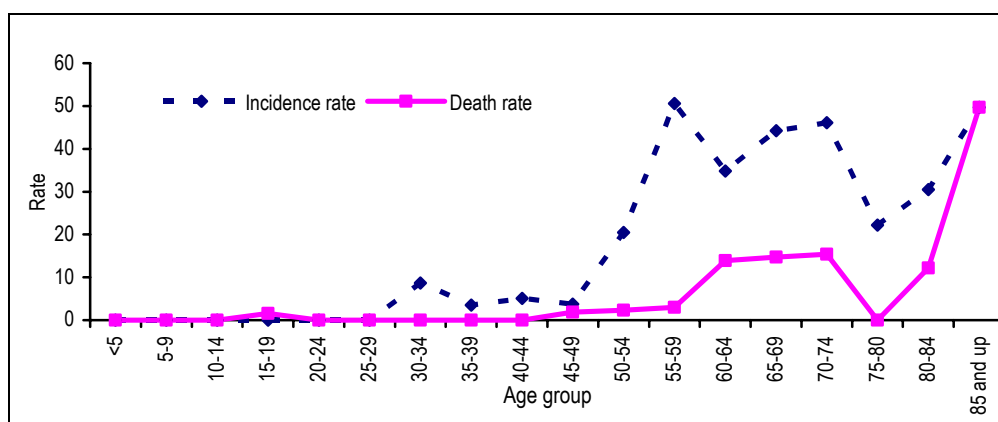
Note: Rates are per 100,000 persons
Source: South Dakota Department of Health

**Table 31: Oral cavity and pharynx age-adjusted death rates by race,
South Dakota and United States, 2002 and 1998-2002**

	2002			1998-2002		
	Total	White	American Indian	Total	White	American Indian
South Dakota +	2.3	2.3	0	2.5	2.4	4.2
United States *	2.7	2.6	2.3	2.8	2.6	2.2

Note: Rates are per 100,000 persons, age-adjusted to 2000 U.S. standard population.
Source: + South Dakota Department of Health; * SEER Cancer Statistics Review 1975-2002

Cancer in South Dakota 2002

OVARY
South Dakota, 2002

Incidence and Mortality Summary

	Females
Number of invasive cases	51
Number of *in situ* cases	1
South Dakota incidence rate+	12.1
United States incidence rate*	13.3
Number of deaths	53
South Dakota death rate+	10.9
United States death rate*	9.2

Rates are per 100,000 persons, age-adjusted to the 2000 standard
+ Source: South Dakota Department of Health
SEER Cancer Statistics Review 1975-2001

Ovarian cancer stage at diagnosis
South Dakota, 2002
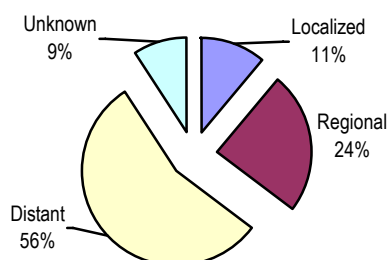
Source: South Dakota Department of Health

Descriptive Epidemiology

Incidence: Ovarian cancer accounted for two percent of the cases reported to the central registry. Of these, only one was American Indian and 45 were white women. About one in every 57 women will get ovarian cancer. Most cases were women over the age of 50, but this disease can also affect younger women.

Stage at diagnosis: Over half of the ovarian cancer cases were diagnosed at distant stage and approximately one-quarter at regional stage. There are no early detection tests and by the time symptoms appear the cancer has already progressed.

Mortality: Ovarian cancer accounted for three percent of cancer deaths. The mortality rates for all sites and by race for 2002 and 1998-2002 were not significantly different from the national rates. The five-year trend for death rates during the period 1998-2002 showed a decrease with -12.1 PC for all races.

The mortality incidence ratio was 1.03 during 2002 due to the high number of cases being diagnosed at distant stages.

Risk and Associated Factors

Family history of a first degree relative with ovarian cancer is the most important risk factor. Fertility drugs, hormone replacement therapy, history of breast or colon cancer, no childbearing history and early menarche also increase risk.

Early Detection and Prevention

Ovarian cancer is difficult to detect early. Many times, women with ovarian cancer have no symptoms or just mild symptoms until the disease is in an advanced stage. Scientists are studying ways to detect ovarian cancer before symptoms develop such as transvaginal ultrasound or the usefulness of measuring the level of the tumor marker, CA 125. The marker is often found in higher-than-normal amounts in the blood of women with ovarian cancer.

Figure 48: Ovary cancer cases and deaths by age, South Dakota, 2002
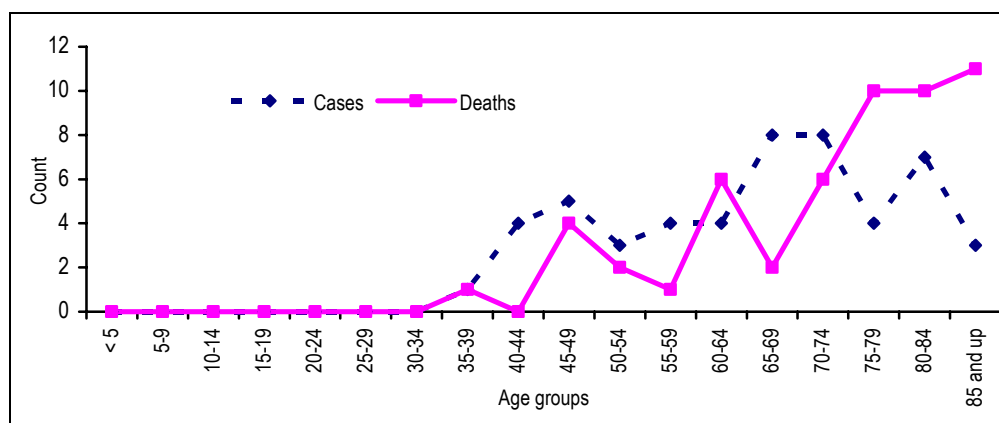
Source: South Dakota Department of Health

Both counts and rates for cases and deaths increased at 40-44 age group and continued as women aged.

**Figure 49: Ovary age-specific incidence and death rates,
South Dakota, 2002**
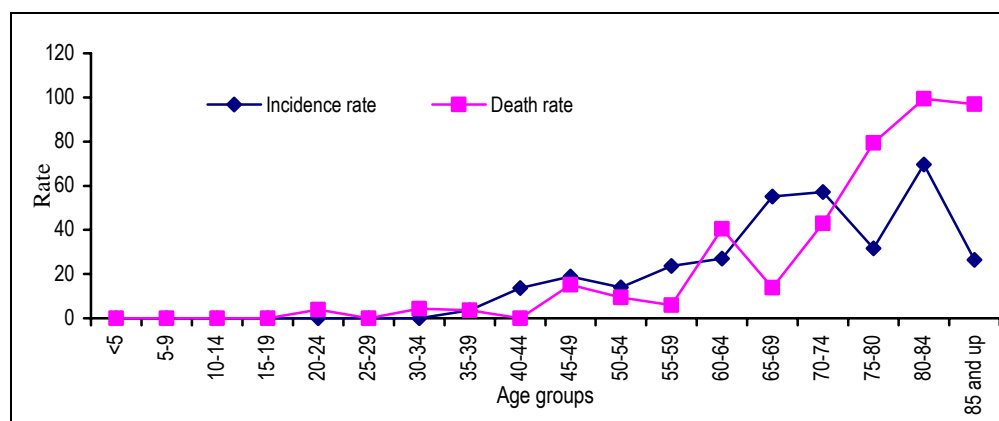
Note: Rates are per 100,000 persons
Source: South Dakota Department of Health

**Table 32: Ovary age-adjusted death rates by race,
South Dakota and United States, 2002 and 1998-2002**

	2002			1998-2002		
	Total	White	American Indian	Total	White	American Indian
South Dakota +	10.9▲	11.3▲	10.1▲	10.9▲	10.8▲	9.2▲
United States *	9.0	9.4	4.9	8.9	9.2	4.9

Note: Rates are per 100,000 persons, age-adjusted to the 2000 U.S. standard population.
▲ denotes rates significantly higher than the national rate
Source: + South Dakota Department of Health;   * *SEER Cancer Statistics Review 1975-2002*

Cancer in South Dakota 2002

PANCREAS
South Dakota, 2002

Incidence and Mortality Summary

	Total	Males	Females
Number of invasive cases	61	32	29
Number of *in situ* cases	0	0	0
South Dakota incidence+	7.4	8.9	6.4
United States incidence*	11.0	12.2	10.0
Number of deaths	86	37	49
South Dakota mortality+	10.4	10.0	10.3
United States mortality*	10.5	12.2	9.2

Rates are per 100,000 persons, age adjusted to the 2000 U.S. standard
Source: + South Dakota Department of Health
  * SEER Cancer Statistics Review 1975-2002

Pancreatic cancer stage at diagnosis
South Dakota, 2002

Source: South Dakota Department of Health

Descriptive Epidemiology

Incidence: There were 75 cases of pancreatic cancer accounting for two percent of reported cancer cases in 2002. Seventy-four cases were white and one was American Indian. Rates increased with age and pancreatic cancer was rare below 40 years of age. Males had higher rates than females.

Stage at diagnosis: Many cases are diagnosed at regional and distant stages. Approximately a third of the cases reported were at distant stage.

Mortality: Pancreatic cancer was the fourth leading cause of cancer deaths accounting for six percent of cancer deaths. It accounted for 25 percent of deaths due to digestive tract cancers. South Dakota's age-adjusted death rates for 2002 and 1998-2002 were not significantly different from the United States rate. The five-year trend in death rate changes showed an increase with a 6.6PC and 1.4 APC for all races. Trends show similar increases for white South Dakotans. Trend data on this cancer for American Indians are too unstable to be reported.

The mortality/incidence ratio was 1.4 for all persons, 1.2 for males and 1.7 for females

Risks and Associated Factors

High dietary fat intake, exposures in industries involving the manufacture of benzene and beta-naphthalene, and metal and leather works are associated with increased risk. Pancreatic cancer is more common in smokers than non-smokers.

Early Detection and Prevention

At present there are no screening tests that can accurately detect early stage pancreatic cancer in asymptomatic individuals. The only chance for cure is surgical resection and only 10 to 25 percent of patients can undergo surgery.

**Figure 50: Pancreatic cancer cases and deaths by age,
South Dakota 2002**
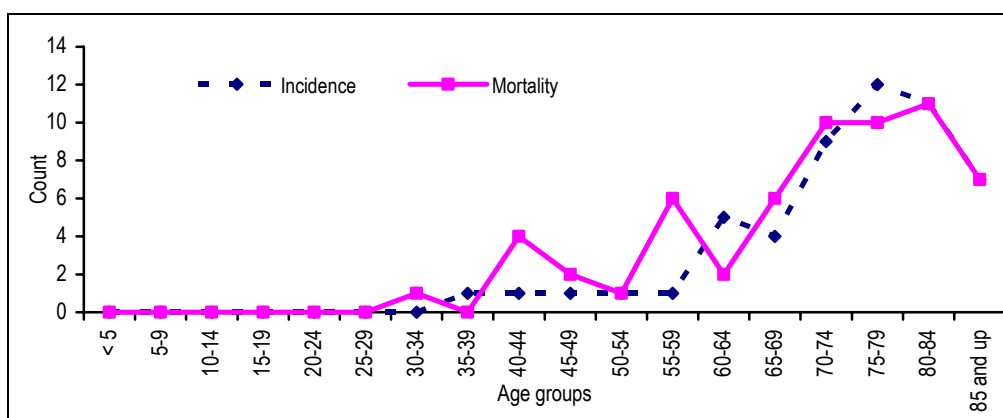
Source: South Dakota Department of Health

Both counts and rates increase with age. This cancer generally has a poor prognosis so death comes within months of diagnosis.

**Figure 51: Pancreatic cancer age-specific incidence and death rates,
South Dakota 2002**
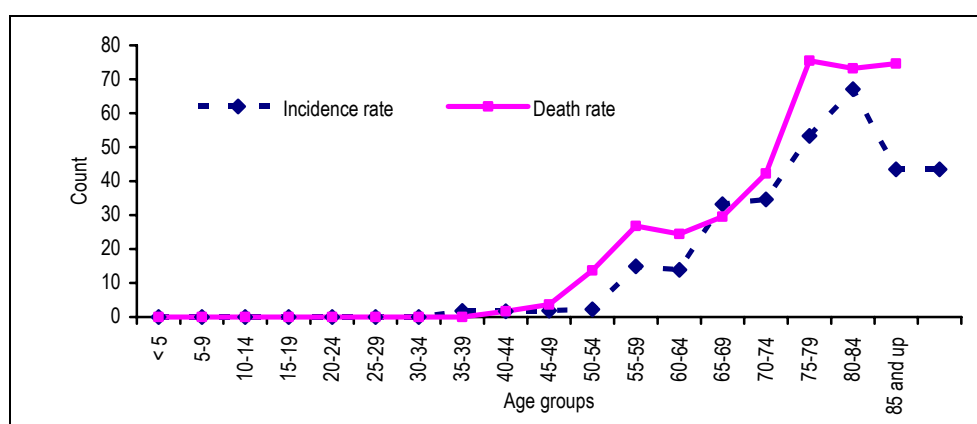
Note: Rates are per 100,000 persons
Source: South Dakota Department of Health

**Table 33: Pancreatic cancer age-adjusted death rates by race,
South Dakota and United States 2002 and 1998-2002**

	2002			1998-2002		
	Total	White	American Indian	Total	White	American Indian
South Dakota +	10.2	10.2	10.1	10.6	10.5	10.8
United States *	10.5	10.3	6.6	10.5	10.3	6.3

Note: Rates are per 100,000 persons age adjusted to the 2000 U.S. standard million
Source: +South Dakota Department of Health;   * SEER Cancer Statistics Review 1975-2002

Cancer in South Dakota 2002

PROSTATE
South Dakota 2002

Incidence and Mortality Summary

	Males
Number of invasive cases	673
Number of *in situ* cases	1
South Dakota incidence rate+	186
United States incidence rate*	171.5
Number of deaths	110
South Dakota death rate+	30.9
United States death rate*	27.8
Health People 2010 Objective	**28.8**

 Rates are per 100,000 persons age adjusted to the 2000 U.S. standard
+ Source: South Dakota Department of Health
**SEER Cancer Statistics Review 1975-2002*

Prostate cancer stage at diagnosis
South Dakota, 2002
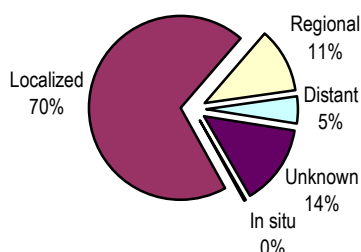
Source: South Dakota Department of Health

Descriptive Epidemiology

Incidence: Prostate cancer is the most common form of cancer diagnosed (other than skin cancer) in males. It is primarily a disease of older men. It was the second leading cancer reported to the SDCR with 670 cases or 19 percent in 2001. Of these, 14 were American Indians.   South Dakota should expect increasing incidence as the population ages and as more men get tested.

Stage at Diagnosis: Seventy percent were diagnosed at the localized stage and 11 and five percent at regional and distant stages, respectively.

Mortality: Prostate cancer is the third leading cause of death due to cancer in South Dakota accounting for seven percent of deaths reported. It is the second

leading cause of cancer death in males. Of the 110 deaths due to prostate cancer, 2 were American Indians. Death rates by race showed whites and American Indians with comparable rates. Overall, rates have increased over the five-year period 1998-2002 with 11.9 percent change (PC) and 1.3 annual percent change (APC) of 1.7 for all races and for whites.

The mortality/incidence ratio was 0.17 in 2002.

Risks and Associated Factors

Family history has been implicated as increased risk for prostate cancer, but it is unknown whether it is because of genetics or the same exposure. Fat consumption is associated with prostate cancer and occupational exposure such as cadmium may increase risk.

Early Detection and Prevention

Increasing levels of prostate specific antigen in the blood indicate the presence of prostate cancer. However, even with widespread use of this test, prostate cancer mortality has not decreased as the test cannot distinguish between slow growing tumors that are not life threatening and aggressive tumors. The American Cancer Society recommends that men 50 years and older should discuss the risks and benefits of screening with their physician. Digital rectal examinations (DRE) and the prostate specific antigen (PSA) are essential components of diagnosing prostate cancer.   There are numerous treatment options including surgery, radiation, hormonal and chemotherapy. Eighty-three percent of prostate cancers are diagnosed in the local and regional stages. It should be noted that the five-year survival rate for patients diagnosed at the local and regional stages is one hundred percent

**Figure 52: Prostate cancer cases and deaths by age,
South Dakota 2002**
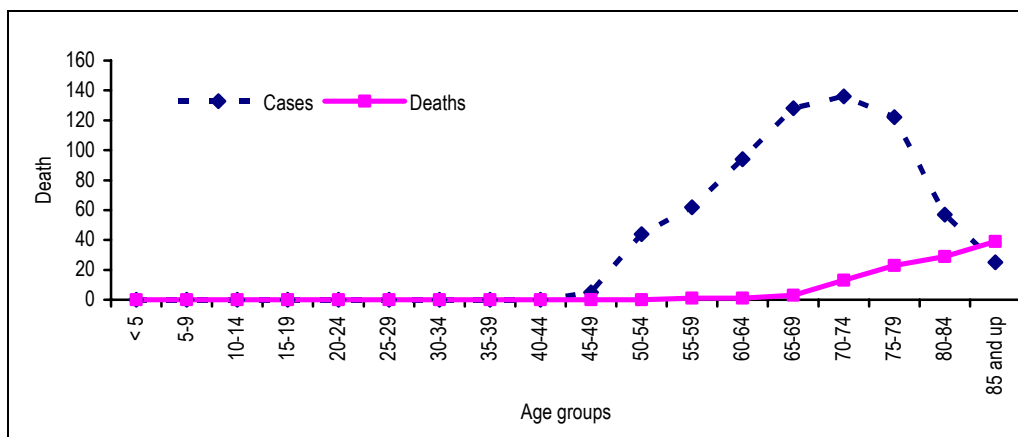
Source: South Dakota Department of Health

Both cases and deaths numbers and rates began to rise during the age 45 and increased with age. Monitoring PSA levels beginning at age 50 will definitely pick up most of these cancers.

**Figure 53: Prostate cancer age-specific incidence and death rates,
South Dakota, 2002**
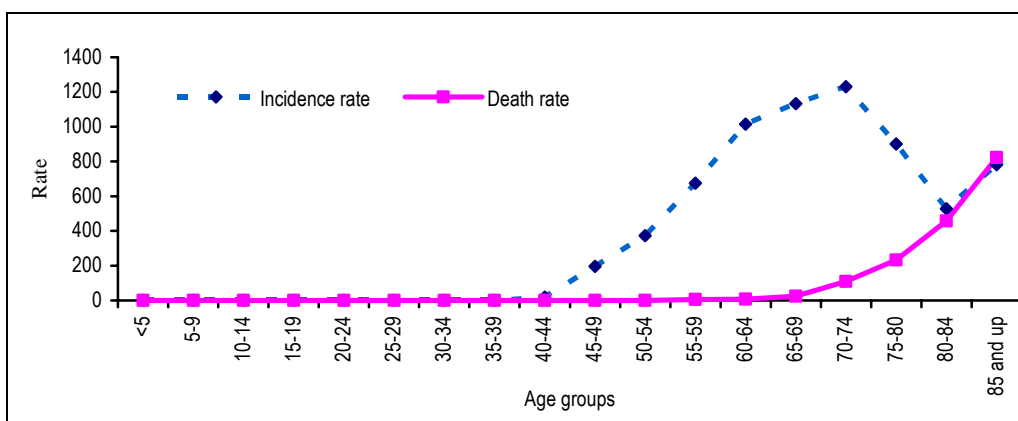
Rates are per 100,000 persons
Source: South Dakota Department of Health

**Table 34: Prostate age-adjusted death rates by race,
South Dakota and United States, 2002 and 1998-2002**

	2002			1998-2002		
	Total	White	American Indian	Total	White	American Indian
South Dakota +	30.9	31.1	§	30.8	30.9	29.6
United States *	28.1	25.8	15.7	30.3	27.7	18.3

Note: Rates are per 100,000 persons, age-adjusted to 2000 U.S. standard population.
§ counts to low to give stable rate
Source: + South Dakota Department of Health;   * *SEER Cancer Statistics Review 1975-2002*

STOMACH
South Dakota 2002

Incidence and Mortality Summary

	Total	Males	Females
Number of invasive cases	49	30	19
Number of *in situ* cases	0	0	0
South Dakota incidence rate+	6.1	8.4	4.2
United States incidence rate*	8.5	11.8	6.0
Number of deaths	34	20	14
South Dakota death rate+	4.0	5.5	2.8
United States death rate*	4.2	5.9	3.0

Rates are per 100,000 persons age-adjusted to the 2000 U.S. standard.
+ Source: South Dakota Department of Health
SEER Cancer Statistics Review 1975-2000

Stomach cancer stage at diagnosis
South Dakota, 2002
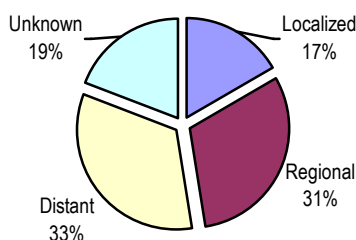
Source: South Dakota Department of Health

Descriptive Epidemiology

Incidence: Stomach cancer accounted for 1.3 percent of cancers reported to the SDCR. Of the 38 cases diagnosed, two were American Indian. Incidence increased with age with more males than females being afflicted.

Stage at diagnosis: Approximately 60 percent of the cases were diagnosed at the regional or distant stage.

Mortality: Stomach cancer accounted for two percent of cancer deaths in 2001 in South Dakota. There was one death among American Indians. Overall the five-

year rate showed a decreasing trend with -23.1 PC and 6.2 APC for all races. Gastric cancer is presently eighth in cancer deaths in the United States and first in the world. Stomach cancer was also the number one cause of cancer deaths in the United States during the 1930's but decreased in part due to improved methods of food preservation such as refrigeration. It remains high in countries far from the equator.

Risk and Associated Factors

Increased risk has been associated with diets high in smoked foods and foods high in nitrates. Higher rates are found among coal miners and asbestos workers. Cigarette smoking is associated with higher rates and infection with *Helicobacter pylori*, polyps and chronic gastritis can increase risk of disease. Persons who have lived their early years in countries such as Japan, where incidence rates are very high, maintain the same risks after immigrating to the United States. However, their offspring have the same risk as whites in the United States, indicating that exposure to the risk factors could be early in life.

**Figure 54: Stomach cancer cases and deaths by age,
South Dakota 2002**
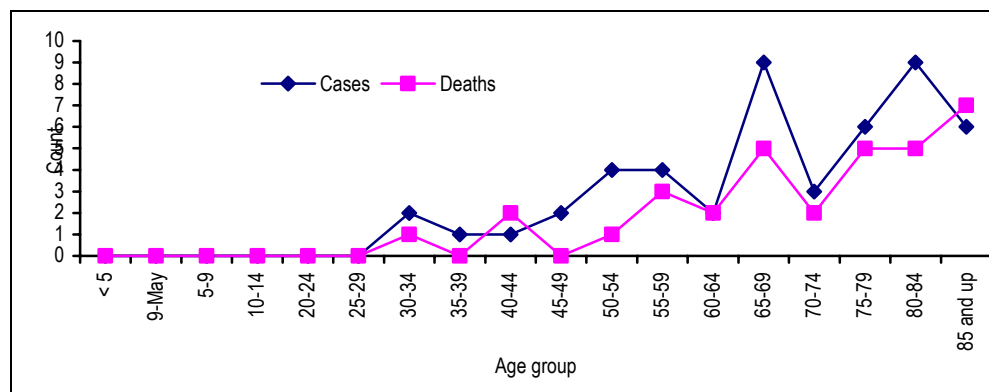
South Dakota Department of Health

Peaks are too numerous to define except that incidence and deaths increase with age.

**Figure 55: Stomach cancer age-specific incidence and death rates,
South Dakota, 2002**
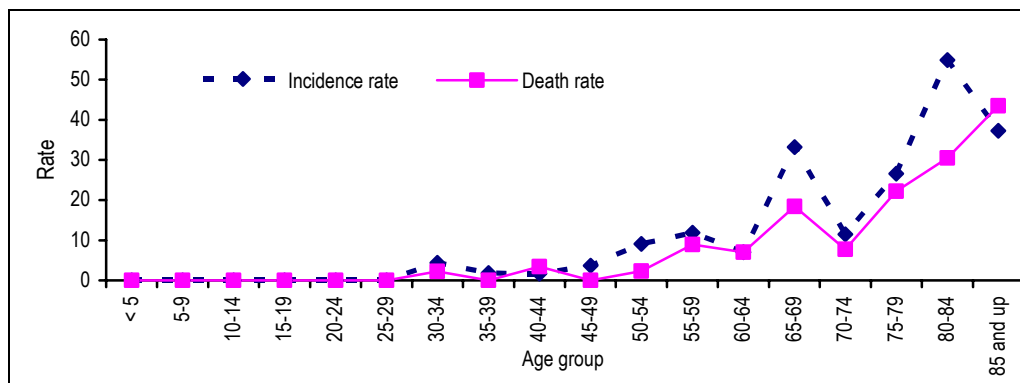
Rates are per 100,000 persons
Source: South Dakota Department of Health

**Table 36: Stomach age-adjusted incidence and death rates,
South Dakota and United States, 2002 and 1998-2002**

	2008			1998-2002		
	Total	White	American Indian	Total	White	American Indian
South Dakota +	4.0	3.4	§	3.8	3.4	10.3
United States *	4.2	3.7	5.4	4.5	4.0	5.4

Note: Rates are per 100,000 persons age adjusted to the 2000 U.S. standard population
§ Count too low for stable rate
Source: +South Dakota Department of Health; * *SEER Cancer Statistics Review 1975-2002*

Cancer in South Dakota 2002

THYROID
South Dakota 2002

Incidence and Mortality Summary

	Total	Males	Females
No. of invasive cases	69	17	52
No. of *in situ* cases	0	0	0
South Dakota incidence rate+	9.5	4.8	14.3
United States incidence rate*	8.6	4.5	12.6
Number of deaths	6	2	4
South Dakota death rate+	0.7	0.5	0.8
United States death rate*	0.5	0.5	0.5

Rates are per 100,000 persons age-adjusted to the 2000 U.S. standard
Source: + South Dakota Department of Health
SEER Cancer Statistics Review 1975-2002

Thyroid cancer stage at diagnosis
South Dakota, 2002

Localized 59%
Regional 23%
Distant 8%
Unknown 10%
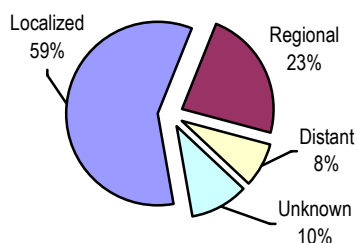
Source: South Dakota Cancer Registry

Descriptive Epidemiology

Incidence: Thyroid cancer was the leading endocrine cancer reported and accounted for one percent of cases reported to the SDCR. Of the 39 cases reported, two were American Indians. Thyroid cancers occurred in people of all ages and occurred more often in men than in women.

Stage at Diagnosis: Almost 60 percent of cases were diagnosed at the localized stage.

Mortality: There were only 6 deaths due to thyroid cancer during 2002. Death rates were not significantly different from the national rates. Five-year trends for the decade 1998-2002 show increases with 93.8 PC and 19.1 APC for all races. These are with low counts.

The mortality/incidence ratio was 0.09 in 2002 for all races.

Risk and Associated Factors

High levels of radiation, exposure in childhood; family history and not enough iodine in the diet increase risk.

Early Detection and Prevention

Cancer of the thyroid is extremely rare, accounting for less than one percent of all cancers diagnosed. Early detection is an important factor for successful treatment. There are no tests for early detection but people with symptoms should seek prompt attention. Symptoms can include: a lump on the side of the neck, hoarseness of the voice, and difficulty swallowing. Most cancerous thyroid tumors are slow-growing and non- fatal. However, as for all cancers, late stage diagnosis will result in a poor prognosis.

**Figure 56: Thyroid cancer cases and deaths by age
South Dakota, 2002**
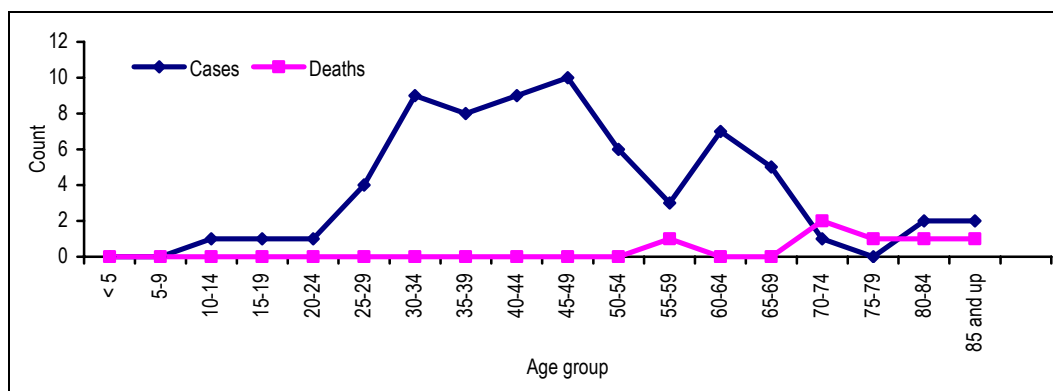
South Dakota Department of Health

Thyroid cancers are diagnosed at early ages but deaths increase at older age-group showing the long survival from this cancer.

**Figure 57: Thyroid cancer age-specific incidence and death rates
South Dakota 2002**
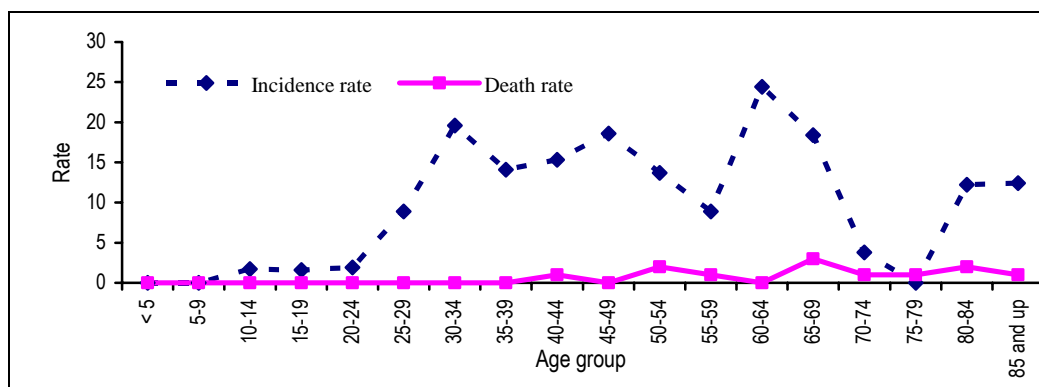
Rates are per 100,000 persons
Source: South Dakota Department of Health

**Table 35: Thyroid age-adjusted incidence and death rates
South Dakota and United States, 2002 and 1998-2002**

	2002			1998-2002		
	Total	White	American Indian	Total	White	American Indian
South Dakota +	3.3	3.2	3.1	3.8	3.5	8.4
United States *	4.3	3.8	5.4	4.7	4.1	5.4

Note: Rates are per 100,000 persons age adjusted to the 2000 U.S. standard population
Source: +South Dakota Department of Health; * *SEER Cancer Statistics Review 1975-2002*

Cancer in South Dakota 2002

VI: APPENDICES

_____

Appendix A. 2000 United States Standard Million Population

Age Group	Number in Group
All ages	1,000,000
<5	69,135
5-9	72,533
10-14	73,032
15-19	72,169
20-24	66,478
25-29	64,529
30-34	71,044
35-39	80,762
40-44	81,851
45-49	72,118
50-54	62,716
55-59	48,454
60-64	38,793
65-69	34,264
70-74	31,773
75-79	26,999
80-84	17,842
85+	15,508

Appendix B: Race in South Dakota by county, 2000 Census

	Total	White		Black		American Indian		Asian/ifi		Hawaiian		Some Other	
South Dakota	754844	669404	89%	6201	1%	68279	9%	5760	1%	361	0%	4839	1%
Aurora	3058	2926	96%	10	0%	65	2%	8	0%	0	0%	49	2%
Beadle	17023	16501	97%	156	1%	228	1%	68	0%	9	0%	61	0%
Bennett	3574	1462	41%	11	0%	2075	58%	3	0%	10	0%	13	0%
BonHomme	7260	6934	96%	59	1%	241	3%	8	0%	1	0%	17	0%
Brookings	28220	27194	96%	119	0%	343	1%	433	2%	11	0%	120	0%
Brown	35460	33854	95%	141	0%	1165	3%	177	0%	37	0%	86	0%
Brule	5364	4823	90%	17	0%	486	9%	33	1%	2	0%	3	0%
Buffalo	2032	332	16%	2	0%	1692	83%	0	0%	0	0%	6	0%
Butte	9094	8687	96%	14	0%	247	3%	30	0%	0	0%	116	1%
Campbell	1782	1770	99%	0	0%	11	1%	1	0%	0	0%	0	0%
CharlesMix	9350	6512	70%	14	0%	2754	29%	11	0%	1	0%	58	1%
Clark	4143	4087	99%	5	0%	31	1%	8	0%	2	0%	10	0%
Clay	13537	12560	93%	173	1%	457	3%	295	2%	3	0%	49	0%
Codington	25897	25054	97%	67	0%	498	2%	107	0%	6	0%	165	1%
Corson	4181	1555	37%	4	0%	2603	62%	5	0%	0	0%	14	0%
Custer	7275	6851	94%	30	0%	325	4%	32	0%	1	0%	36	0%
Davison	18741	18034	96%	80	0%	445	2%	101	1%	10	0%	71	0%
Day	6267	5719	91%	11	0%	514	8%	5	0%	3	0%	15	0%
Deuel	4498	4431	99%	5	0%	30	1%	15	0%	6	0%	11	0%
Dewey	5972	1442	24%	3	0%	4503	75%	9	0%	3	0%	12	0%
Douglas	3458	3391	98%	6	0%	50	1%	5	0%	0	0%	6	0%
Edmunds	4367	4332	99%	6	0%	13	0%	10	0%	1	0%	5	0%
Fall River	7453	6746	91%	29	0%	606	8%	26	0%	8	0%	38	1%
Faulk	2640	2626	99%	2	0%	10	0%	1	0%	0	0%	1	0%
Grant	7847	7738	99%	2	0%	47	1%	25	0%	0	0%	35	0%
Gregory	4792	4465	93%	2	0%	298	6%	18	0%	0	0%	9	0%
Haakon	2196	2117	96%	0	0%	74	3%	4	0%	0	0%	1	0%
Hamlin	5540	5456	98%	9	0%	49	1%	17	0%	1	0%	8	0%
Hand	3741	3715	99%	2	0%	11	0%	8	0%	0	0%	5	0%
Hanson	3139	3124	99%	0	0%	5	0%	8	0%	1	0%	1	0%
Harding	1353	1321	98%	4	0%	15	1%	8	1%	0	0%	5	0%
Hughes	16481	14654	89%	38	0%	1631	10%	85	1%	4	0%	69	0%
Hutchinson	8075	7980	99%	14	0%	64	1%	9	0%	0	0%	8	0%
Hyde	1671	1522	91%	4	0%	141	8%	0	0%	2	0%	2	0%
Jackson	2930	1467	50%	1	0%	1453	50%	4	0%	1	0%	4	0%
Jerauld	2295	2272	99%	2	0%	18	1%	3	0%	0	0%	0	0%
Jones	1193	1143	96%	0	0%	47	4%	0	0%	1	0%	2	0%
Kingsbury	5815	5730	99%	8	0%	33	1%	31	1%	0	0%	13	0%
Lake	11276	11023	98%	35	0%	99	1%	67	1%	1	0%	51	0%
Lawrence	21802	20884	96%	71	0%	629	3%	104	0%	14	0%	100	0%
Lincoln	24131	23539	98%	133	1%	204	1%	156	1%	9	0%	90	0%
Lyman	3895	2522	65%	3	0%	1351	35%	14	0%	0	0%	5	0%
Marshall	5832	5766	99%	5	0%	36	1%	15	0%	0	0%	10	0%
McCook	2904	2885	99%	0	0%	12	0%	5	0%	0	0%	2	0%
McPherson	4576	4237	93%	8	0%	312	7%	5	0%	3	0%	11	0%
Meade	24253	22471	93%	444	2%	829	3%	286	1%	19	0%	204	1%
Mellette	2083	932	45%	0	0%	1143	55%	2	0%	0	0%	6	0%
Miner	2884	2848	99%	18	1%	11	0%	4	0%	0	0%	3	0%
Minnehaha	148281	137941	93%	2916	2%	3457	2%	1895	1%	93	0%	1979	1%
Moody	6595	5600	85%	28	0%	909	14%	46	1%	1	0%	11	0%
Pennington	88565	76789	87%	1028	1%	8735	10%	1080	1%	72	0%	861	1%
Perkins	3363	3250	97%	9	0%	73	2%	9	0%	0	0%	22	1%
Potter	2693	2643	98%	0	0%	33	1%	13	0%	1	0%	3	0%
Roberts	10016	6840	68%	17	0%	3121	31%	33	0%	0	0%	5	0%
Sanborn	2675	2645	99%	3	0%	10	0%	13	0%	1	0%	3	0%
Shannon	12466	562	5%	10	0%	11850	95%	4	0%	6	0%	34	0%
Spink	7454	7272	98%	20	0%	133	2%	15	0%	1	0%	13	0%
Stanley	2772	2579	93%	8	0%	172	6%	9	0%	0	0%	4	0%
Sully	1556	1522	98%	3	0%	20	1%	5	0%	0	0%	6	0%
Todd	9050	1138	13%	8	0%	7861	87%	18	0%	0	0%	25	0%
Tripp	6430	5625	87%	10	0%	782	12%	7	0%	0	0%	6	0%
Turner	8849	8748	99%	23	0%	43	0%	24	0%	0	0%	11	0%
Union	12584	12187	97%	55	0%	87	1%	191	2%	7	0%	57	0%
Walworth	5974	5172	87%	7	0%	776	13%	11	0%	2	0%	6	0%
Yankton	21652	20592	95%	289	1%	469	2%	116	1%	7	0%	179	1%
Ziebach	2519	665	26%	0	0%	1844	73%	2	0%	0	0%	8	0%

U.S Census Bureau 2000

Cancer in South Dakota 2002

Appendix C: SEER Incidence Site Analysis Categories

Site Group	ICD-O-2 Site excludes histological type 9590-9989
Oral Cavity and Pharynx	
Lip	C000-C009
Tongue	C019-C029
Salivary Gland	C079-C089
Floor of Mouth	C040-C049
Gum and Other Mouth	C030-C039, C050-C059, C060-C069
Nasopharynx	C110-C119
Tonsil	C090-C099
Oropharynx	C100-C109
Hypopharynx	C129, C130-C139
Other Oral Cavity and Pharynx	C140, C142-C148
Digestive System	
Esophagus	C150-C159
Stomach	C160-C169
Small Intestine	C170-C179
Colon and Rectum	
Colon excluding Rectum	
Cecum	C180
Appendix	C181
Ascending Colon	C182
Hepatic Flexure	C183
Transverse Colon	C184
Splenic Flexure	C185
Descending Colon	C186
Sigmoid Colon	C187
Large Intestine, NOS	C188-C189, C260
Rectum and Rectosigmoid Junction	
Rectosigmoid Junction	C199
Rectum	C209
Anus, Anal Canal and Anorectum	C210-C212, C218
Liver and Intrahepatic Bile Duct	
Liver	C220
Intrahepatic Bile Duct	C221
Gallbladder	C239
Other Biliary	C240-C249
Pancreas	C250-C259
Retroperitoneum	C480
Peritoneum, Omentum and Mesentery	C481-C482
Other Digestive Organs	C268-C269, C488
Respiratory System	
Nose, Nasal Cavity and Middle Ear	C300-C301, C310-C319
Larynx	C320-C329
Lung and Bronchus	C340-C349
Pleura	C384
Trachea, Mediastinum and Other Respiratory Organs	C339, C381-C383, C388, C390, C398, C399
Bones and Joints	C400-C419
Soft Tissue including Heart	C380, C470-C479, C490-C499
Skin excluding Basal and Squamous	
Melanoma of the Skin	C440-C449
Other Non-Epithelial Skin	C440-C449
Breast	C500-C509

Source: http://seer.cancer.gov/siterecode

Appendix C: SEER Incidence Site Analysis Categories (cont'd)	
Female Genital System	
Cervix Uteri	C530-C539
Corpus and Uterus, NOS	
Corpus Uteri	C540-C549
Uterus, NOS	C559
Ovary	C569
Vagina	C529
Vulva	C510-C519
Other Female Genital Organs	C570-C589
Male Genital System	
Prostate	C619
Testis	C620-C629
Penis	C600-C609
Other Male Genital Organs	C630-C639
Urinary System	
Bladder	C670-C679
Kidney and Renal Pelvis	C649, C659
Ureter	C669
Other Urinary Organs	C680-C689
Eye and Orbit	C690-C699
Brain and Other Nervous System	
Brain	C710-C719
Cranial Nerves Other Nervous System	C710-C719
	C700-C709, C720-C729
Endocrine System	
Thyroid	C739
Other Endocrine including Thymus	C379, C740-C749, C750-C759
Lymphoma	
Hodgkin Lymphoma	
Hodgkin - Nodal	C024, C098-C099, C111, C142, C379, C422, C770-C779
Hodgkin - Extranodal	All other sites
Non-Hodgkin Lymphoma	
NHL - Nodal	C024, C098-C099, C111, C142, C379, C422, C770-C779
NHL - Extranodal	All sites except C024, C098-C099, C111, C142, C379, C422, C770-C779
	All sites except C024, C098-C099, C111, C142, C379, C420-C422, C424, C770-C779
Myeloma	
Leukemia	
Lymphocytic Leukemia	
Acute Lymphocytic Leukemia	
Chronic Lymphocytic Leukemia	C420, C421, C424
Other Lymphocytic Leukemia	
Myeloid and Monocytic Leukemia	
Acute Myeloid Leukemia	
Acute Monocytic Leukemia	
Chronic Myeloid Leukemia	
Other Myeloid/Monocytic Leukemia	
Other Leukemia	
Other Acute Leukemia	
Aleukemic, Subleukemic and NOS	
	C420, C421, C424
	C760-C768, C809
	C420-C424
	C770-C779

Appendix D: SEER cancer cause of death analysis categories

Cancer Causes of Death	ICD-10
All Malignant Cancers	C00-C97
Oral Cavity and Pharynx	
Lip	C00
Tongue	C01-C02
Salivary Gland	C07-C08
Floor of Mouth	C04
Gum and Other Mouth	C03, C05-C06
Nasopharynx	C11
Tonsil	C09
Oropharynx	C10
Hypopharynx	C12-C13
Other Oral Cavity and Pharynx	C14
Digestive System	
Esophagus	C15
Stomach	C16
Small Intestine	C17
Colon and Rectum	
Colon excluding Rectum	C18, C26.0
Rectum and Rectosigmoid Junction	C19-C20
Anus, Anal Canal and Anorectum	C21
Liver and Intrahepatic Bile Duct	
Liver	C22.0, C22.2-C22.4, C22.7, C22.9
Intrahepatic Bile Duct	C22.1
Gallbladder	C23
Other Biliary	C24
Pancreas	C25
Retroperitoneum	C48.0
Peritoneum, Omentum and Mesentery	C45.1+, C48.1-C48.2
Other Digestive Organs	C26.8-C26.9, C48.8
Respiratory System	
Nose, Nasal Cavity and Middle Ear	C30-C31
Larynx	C32
Lung and Bronchus	C34
Pleura	C38.4, C45.0+
Trachea, Mediastinum and Other Respiratory Organs	C33, C38.1-C38.3, C38.8, C39
Bones and Joints	C40-C41
Soft Tissue including Heart	C47, C49, C38.0, C45.2+
Skin excluding Basal and Squamous	
Melanoma of the Skin	C43
Other Non-Epithelial Skin	C44, C46+
Breast	C50
Female Genital System	
Cervix Uteri	C53
Corpus and Uterus, NOS	
Corpus Uteri	C54
Uterus, NOS	C55
Ovary	C56
Vagina	C52
Vulva	C51
Other Female Genital Organs	C57-C58

Appendix D: SEER cancer cause of death analysis categories (Continued)

Male Genital System	
Prostate	C61
Testis	C62
Penis	C60
Other Male Genital Organs	C63
Urinary System	
Bladder	C67
Kidney and Renal Pelvis	C64-C65
Ureter	C66
Other Urinary Organs	C68
Eye and Orbit	C69
Brain and Other Nervous System	C70, C71, C72
Endocrine System	
Thyroid	C73
Other Endocrine including Thymus	C37, C74-C75
Lymphoma	
Hodgkin Lymphoma	C81
Non-Hodgkin Lymphoma	C82-C85, C96.3
Myeloma	C90.0, C90.2
Leukemia	
Lymphocytic Leukemia	
Acute Lymphocytic Leukemia	C91.0
Chronic Lymphocytic Leukemia	C91.1
Other Lymphocytic Leukemia	C91.2-C91.4, C91.7, C91.9
Myeloid and Monocytic Leukemia	
Acute Myeloid	C92.0, C92.4-C92.5, C94.0, C94.2
Acute Monocytic Leukemia	C93.0
Chronic Myeloid Leukemia	C92.1
Other Myeloid/Monocytic Leukemia	C92.2-C92.3, C92.7, C92.9, C93.1-C93.2, C93.7, C93.9
Other Acute Leukemia	C94.4, C94.5, C95.0
Aleukemic, Subleukemic and NOS	C90.1, C91.5, C94.1, C94.3, C94.7, C95.1, C95.2, C95.7, C95.9
Mesothelioma (ICD-10 only)+	C45+
Kaposi Sarcoma (ICD-10 only)+	C46+
Miscellaneous Malignant Cancer	C26.1, C45.7+, C45.9+, C76-C80, C88, C96.0-C96.2, C96.7, C96.9, C97

Source: http://seer.cancer.gov/codrecode

REFERENCES

Beahrs, O.H. et al, AJCC Staging Manual, 5th Edition. American Joint Committee on Cancer, Lippincott, Williams and Wilkins. 1995

Cancer Facts and Figures, 2002. Atlanta. American Cancer Society. 2002

Cancer Progress Report, U.S. Department of Health and Human Services, National Cancer Institute. 2001

Harvard Center for Cancer Prevention. Harvard Report on Cancer Prevention Volume 1: Causes of Human Cancer, 1996:7 (S1): 7-15

Lenhard, Raymond et al. Clinical Oncology. The American Cancer Society. Bethesda, MD. 2001

Nascar, Philip and Harris Pastides. Fundamentals of Cancer Epidemiology. Aspen Publications, Maryland. 2001

Ries LAG, Eisner MP, Kosary CL, Hankey BF, Miller BA, Clegg L, Mariotto A, Fay MP, Feuer EJ, Edwards BK (eds). *SEER Cancer Statistics Review, 1975-2020*, National Cancer Institute. Bethesda, MD, http://seer.cancer.gov/csr/1975_2002. April 2005

Schottenfeld, David and Joseph Fraumenis, Cancer Epidemiology and Prevention, 2nd Edition. Oxford University Press. 1996

This document is only available online at
10H<ins>http://www.state.sd.us/doh/Pubs2/Cancer2002.pdf</ins>